

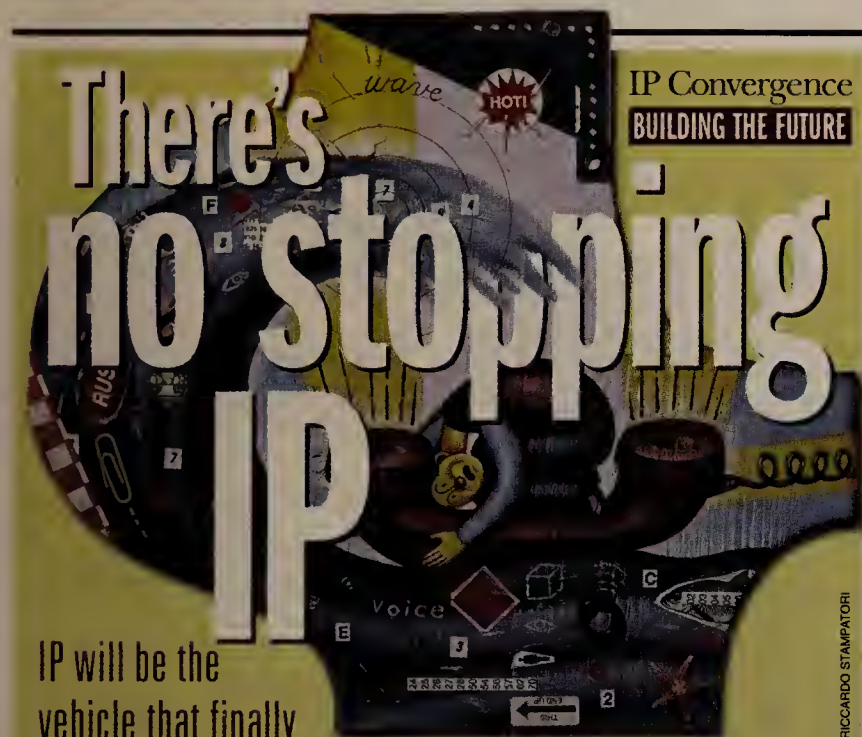
# NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

Cheap voice and data **Page 8.**



Signal's Land (left) and Perlman are selling International services for less.



IP will be the vehicle that finally delivers voice/data convergence, but only if carriers and suppliers can ride out some tough issues.

**T**here is no escape. Convergence is coming, riding the IP wave high and hard. This convergence — where voice, data and video all share the same packet net — will establish a new world order in the network industry and bring with it a new set of rules you'll need to learn and live by. We'll get you up to speed with this special section that examines the convergence phenomenon from all angles.

- THE BIG PICTURE:** The opportunities and the obstacles. Page 35.
- ECONOMICS:** How convergence saves you money. Page 37.
- REGULATORY:** Government may yet turn the tables on IP. Page 52.
- CUSTOMERS:** Pioneers who are putting convergence to work (Page 56) and tips on how to become one of them. Page 61.
- TECHNOLOGY:** The standards that make it all possible. Page 60.
- CARRIERS:** Who's planning what. Page 62.
- PUNDITS:** Opinions from *Network World* columnists. Pages 36, 48 & 60.

## FCC drops ball on RBOC deregulation

*Complex government proposal, containing numerous exceptions, finding few fans.*

**By David Rohde**  
Washington, D.C.

A long-anticipated government proposal to give broadband public networks a big boost appeared to fall flat just hours after being proffered.

The Federal Communications Commission last week proposed letting regional Bell operating companies establish largely deregulated subsidiaries to offer data services over digital subscriber lines (DSL) and other advanced technologies.

The idea is to speed up advanced technology deployment

by freeing the RBOCs of the requirements to resell their services or lease ports on their switches to competitors. The RBOCs previously complained those requirements discouraged them from investing in high-speed nets.

But the FCC included so many

exceptions and qualifications in last week's proposal that almost no one seemed to be happy with it. Most notably, none of the five RBOCs said they would move their DSL deployments into the new regulatory structure or accel-

*See RBOCs, page 12*

*"What the American consumer wants is more bandwidth from multiple providers. We really don't care who gets there first."*

William Kennard, chairman, FCC



## Y2K consultants on hot seat

**By Paul McNamara**

Customers are buying costly third-party solutions for Year 2000 glitches in Dell servers and PCs that the company insists can be fixed for free.

Other hardware vendors,

most notably Compaq, and Year 2000 experts have voiced similar skepticism about some consultants' Year 2000 fixes. Last week, a spokesman for National Software Testing Laboratory (NSTL) called the tac-

tics of these Year 2000 consultants "ethically wrong" and "a disservice."

"They're just here to make the quick buck," said Mark Paxson, manager of design verification for NSTL. "There are a lot of Year 2000 companies that are doing this, and it's having a significant impact."

However, one of the reported offenders, a British company called Prove It 2000, vehemently disputed such characterizations. CEO Richard Coppel

*See Y2K, page 77*

## Convention exposes hackers' dark underbelly

**By Ellen Messmer**  
Las Vegas

The Def Con hacker convention held recently at Jack Gaughan's Plaza Hotel in downtown Las Vegas drew a crazy mix of the evil, the curious, the leather-clad, the frat boys, the

blue-haired cyberpunks and the feds in surveillance, who failed miserably to blend in.

Amid blaring rock music and a haze of cigarette smoke, the hacker group The Cult of the Dead Cow at one point took center stage to show us how

truly evil they are. One cloaked, hooded member of the hacker group demoed the group's latest product. As a crude insult to Microsoft and its BackOffice

suite, it's called "BackOrifice" — malicious code designed to let the attacker take over the victim's Windows machine.

*See Def Con, page 76*

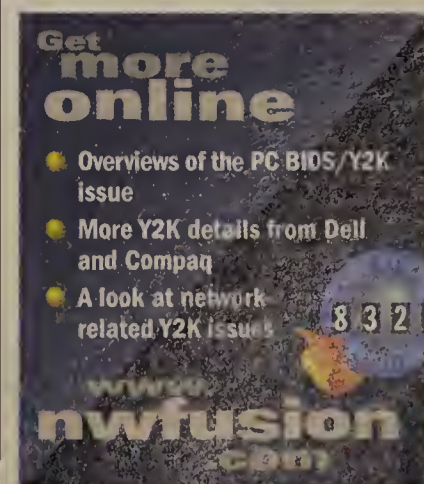
## Hiding out on the Internet

**By Ellen Messmer and Denise Pappalardo**  
Montreal

Hiding your identity on the 'Net isn't easy given that IP addresses and domain names give clues about who and where you are. On top of that, snoops can pore over your unencrypted data with network sniffers.

But Zero-Knowledge Systems (ZKS), a start-up based here, wants to change that with new desktop software which will

*See ZKS, page 76*



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# ***THE CIO IS IN THE* hot seat as the executive**

committee drills one department head after another on escalating costs. How are you going to <sup>1</sup>(get the newly acquired subsidiary onto our e-mail system)? How are you going to <sup>2</sup>(hold down your network administration head count) as you add hundreds of new users? How can you afford to <sup>3</sup>(roll out new apps to the whole company)? It's like the Spanish Inquisition, but the food is worse. Her stomach rumbles from the dry turkey sandwich and yuppie water served at the start of the meeting as one committee member wakes up long enough to ask about the <sup>4</sup>(Year 2000 problem) he saw on a CNN segment. "Not a problem, we have it covered," she replies. With an unforeseen compliment for completing the <sup>5</sup>(global supplier extranet) project, she is excused. Exiting, she smiles at the beleaguered marketing director, who is about to be skewered because the company's celebrity pitchman has just appeared on the cover of a major supermarket tabloid.

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News briefs, August 10, 1998

**Unsportsmanlike conduct**

Published reports last week said IBM is ending a 38-year sponsorship of the Olympic Games. After months of negotiations, Big Blue blew off a proposed 8-year deal with the International Olympic Committee (IOC). IBM spent over \$100 million to sponsor the 1998 Winter Games in Nagano, Japan, where the company provided much of the behind-the-scenes technology for free. This time, IBM wanted local Olympic-organizing committees to share the technology costs. Alas, the IOC and IBM could not agree on what the costs should be. IBM executives were also a bit cranky that the IOC wanted a more profitable sponsorship deal for upcoming Games' Internet services and sites. IBM is still slated to sponsor the 2000 Summer Games in Sydney, Australia, but those will be its last.

**Creeping expansionism**

There goes the neighborhood. Last week, Microsoft broke ground on a new campus in Silicon Valley. Steve Ballmer, recently named president of Microsoft, headed up the proceedings, which outlined the company's plans for expanding into new Mountain View, Calif., offices. At present, the plans call for five buildings to be erected in the 32-acre lot, to house groups focusing on such projects as HotMail, PowerPoint, WebTV, Macintosh Internet products and local sales and marketing efforts. Staffing is expected to start with 800 employees, and occupancy is targeted for next summer. Much ado was made over the return to Mountain View, where Microsoft opened a five-person office in 1981. The new digs will put a large Microsoft contingent in close proximity to such foes as Oracle, Sun and Netscape.



Microsoft's Ballmer

**Computer Associates always gets its technology**

Although Computer Associates suffered a high-profile failure earlier this year when trying to buy Computer Sciences Corp. (CSC) to beef up its professional services offerings, CA last week made up for lost time. CA said it will acquire ReaLogic, a consulting firm specializing in application development and systems integration. CA's attempt to buy CSC rapidly degenerated into an acrimonious hostile takeover bid, which died when CA let its offer expire in mid-March. The company then launched its own professional services unit in a move that CA Chairman and CEO Charles Wang at the time jokingly called "plan B." The ReaLogic acquisition, which was made for an undisclosed sum, is the first in a series of purchases designed to meet increasing user demand for turnkey consulting and professional services, officials said.

**It's a jungle out there**

Looking to bolster the electronic commerce services it offers to customers, Amazon.com last week announced definitive agreements to acquire two Internet companies, PlanetAll and Junglee. The transactions have an aggregate value of about \$280 million. PlanetAll offers a Web-based address book, calendar and reminder service. Junglee provides Web-based virtual database technology that aids shoppers in locating products on the Internet.

**Microsoft cranks up another new office**

The software giant wasn't just digging in the dirt last week. Microsoft has added yet another version of the upcoming Office 2000 to its product catalog and shipped a "Beta 1" to 20,000 software providers, enterprise customers and individual test sites. The new package, which is going by the working title "High-End Office 2000," will combine a redesigned Front Page 2000 with the Office suite of applications. Because Office 97 was released in January, 1997, it's not likely that Office 2000 will be finalized until the first quarter of 1999 at the earliest, officials said.

# Software makers back consistent file-handling

*Twenty-three vendors define way to standardize software installation.*

By Andy Eddy

Just say no.

Stop, drop and roll.

Ask, tell and help.

All of the best campaigns have catchy phrases that are meant to inspire behavior modification. Though "Ask, tell and help" may not be familiar today, it could become popular among computer users if an assemblage of vendors has its way in creating a consistent process for software installation.

Last week, 23 companies — including such big names as Novell, Netscape and Sun — banded together in support of a proposition entitled "Ask, Tell and Help: Fair Practices and Conventions for Handling File Formats in the Era of the Internet." The undertaking is designed to put the decision of how applications interact with various file formats into the hands of the user.

**Conspicuous by its absence**

A conspicuous dissenter in this action is Microsoft. Taking a firm stand, Adam Sohn, a public relations manager at Microsoft, indicated that the software giant won't be joining in on the Ask, Tell and Help consortium, labeling it a "publicity stunt."

"At this point, we have no plans to participate. It's a narrow look at a broader issue, at how applications interact with each other," Sohn said. "We're constantly looking at making this process better."

This action follows the controversial demonstration that Rob Glaser, CEO of RealNetworks, gave in front of a Senate hearing last month. He showed how installation of Microsoft's Windows Media Player (WMP) disables RealNetworks' RealPlayer.

Blame for the problem has been a matter of dispute: Some say that at installation WMP wrests control from RealPlayer and other companies' products, while others have stated that a bug in RealPlayer triggers the problem. Since the hearing,

RealNetworks has updated its new G2 beta so it can't be disabled as easily, and has provided instructions for users of its other programs on how to avoid such problems.

Such consistency will most certainly lead to less confusion and potentially fewer support requests.

This process may be a welcome change to many, but one manager of development and technology at a large space and defense company noted that the Ask, Tell and Help concept may be hard to fulfill, even if it evolves into an industry standard.

"Standards are implemented by a company only when it's in the company's best interests," he said. "Will the market say, 'We have this standard, and you'd better adhere or we won't buy your software?'"

According to one company spokesman close to the process, the next step is likely to be the creation of a vendor-neutral organization to drive further discussion of how the proposition can be implemented. Ken Wasch, president of the Software Publishers Association (SPA), indicated that the Ask, Tell and Help action is a positive move that will likely be a hot topic for attendees at next month's SPA conference in Chicago.

"The rules of the road ought to be made clear so that users are given sufficient information to enable them to make intelligent decisions," Wasch said. ■

**Striving to be fair**

**The proposed "Fair Practice and Conventions" plan for making software installation consistent:**

**Ask:** .....  
At install, the program will ask the user for permission before defining itself as the default program for other file formats.

**Tell:** .....  
During that process, the program will provide an explanation of any limitations it might face as the default program.

**Help:** .....  
For files the program can't read, information about downloadable third-party programs that can read the files will be offered.

The Microsoft-RealNetworks conflict is indicative of how applications may battle each other for control over particular files, often at the whim of their programmers. Under the Ask, Tell and Help plan, the user will be given more information and control over how programs handle various file formats.

Be a

**NET KNOW-IT-ALL**

For the answer to this week's question and more net trivia, visit **Network World Fusion** and enter **2349** in the DocFinder box.



***This week's question:***

**What special bond is shared by the chairmen of application server company Silverstream and application development tool vendor AlphaBlox?**

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# Upstart carrier cuts international costs

*Cignal's ATM fiber network yields significant savings for overseas voice and data service.*

By Tim Greene

Cambridge, Mass.

Cignal Global Communications, Inc. is a next-generation telephone network run by the new generation.

Founded in 1995 by a 20- and a 21-year-old, both college dropouts, Cignal last week lit up the San Francisco-Hong Kong link of its international ATM fiber network.

So far, Cignal's network avoids only the intercontinental links between Asia and Europe, yet the links still represent a big chunk of the cost of an international call. But the company is building out its network to land directly in additional countries.

Cignal is still working through its pricing, but its initial offerings to corporate customers were about 80% off what other carriers charged. Cignal no longer offers such deep cuts but officials said the company will wholesale to other carriers for 20% off what other wholesalers charge.

## Data gear savings

Part of the savings is due to the fact that data gear costs less than voice switches. Also, data traffic coming into foreign countries avoids a settlement fee levied on incoming voice calls. The settlement fee varies, but in England it's 35 cents per minute, and in China it's \$1.25 per minute. By sending voice on a data line, the call sneaks through without being taxed.

Here's how Cignal's service works: A customer dials the Cignal network, enters a PIN code and dials the phone number he wants to call.

A Nortel voice switch in Cignal's network drops the traffic onto a General DataComm ATM switch, which compresses the voice, converts it into cells and sends it across a transoceanic optical fiber cable.

On the receiving end, Cignal switches put the voice traffic back onto the local public telephone network.

Cignal is the offspring of college friends Andrew Perlman and Mark Land. They founded the company with plans to run voice traffic over frame relay but had trouble finding carrier-grade equipment to support it. The pair decided ATM hard-

ware was more scalable and offered better control of voice quality.

As it turns out, Perlman and Land did base their first voice service on frame relay. Two years ago, Nancy Kinchla, director of telecommunications for Harvard University's Information Systems department, decided to give the service a try for phone calls to London. "I'd heard it couldn't be done, and I wanted to see if it could," Kinchla said.

Cignal's voice-over-frame relay service worked so well in trials with one university depart-

ment, and I don't need it on paper," she said.

Because no one had done what Cignal was doing, the company developed some of the key technology in-house. For example, Cignal holds a patent on how to send voice-network signaling over packet networks. The company is also about to implement a new voice-compression algorithm so voice can travel on an ATM network using just 2% of the bandwidth it would need in a traditional circuit-switched voice network.

The seeming ease with which Perlman and Land innovate has

from the university on technology that read "fingerprints" on the magnetic strips on credit cards so they could build a scanner to stop credit card fraud.

The university said it did not license patents to its students, so Perlman and Land dropped out. The school still said no.

So the pair moved to Boston, where they decided to get into telecommunications because they heard it was the fastest growing field behind health care. They started off telemarketing for a long-distance reseller. "We called people up at dinner time and tried to get them to switch from Sprint to AT&T," Perlman said.

Comments from people they called indicated that what customers really wanted was cheaper international rates, so Perlman and Land bought bulk international capacity from Wiltel, now WorldCom, and resold it.

## Avoiding the repo man

Then they heard that packet voice made more efficient use of bandwidth and thus could carry traffic even less expensively. The duo decided to set up Cignal to develop their own voice-over-frame relay network.

The partners sought money from family, friends and people they met at parties, and finally found an elderly investor. According to Perlman, the investor said, "I don't understand what you are talking about, but I'm interested." He wound up providing \$1 million.

The money ran dry just about the time the network was ready to go online. So they limped along using credit cards and money borrowed from friends' parents, and by not paying bills until vendors threatened to repossess gear. "We knew we had a great idea, we just didn't have any money," Land said.

After they got a few paying customers, the partners went to major finance houses seeking additional capital. The money-lenders liked them and gave them more funding.

Perlman and Land used the money to switch to ATM technology, and they've gathered a seasoned team of telecom pros for their executive staff.

What's next? Cignal will support enhanced data services,

such as secure IP with service quality guarantees.

And as chief technology officer, Land will keep scouting for new opportunities. "As long as we don't stay stuck in one place, I'm sure we will continue to have opportunities," he said. ■

## START-UP SPOTLIGHT



Cignal founders  
Mark Land (left)  
and Andrew  
Perlman

## PROFILE: SIGNAL GLOBAL COMMUNICATIONS

**Headquarters:** Cambridge, Mass.

**Founded:** 1995

**Primary business:** International voice and data services over an ATM network

**Funding:** \$28.5 million total from Allen Associates Properties, Spencer Trask Securities and Viatel Global Communications

**Employees:** 20

**Competitors:** Equant, Pacific Gateway Exchange, Digital Island

ment, Kinchla decided to try it in other departments. "They said it was better voice than anything we had given them before," she said.

With the switch to the ATM backbone and the new Hong Kong link in place, Cignal is even more attractive, she said. "I'd like to get serious about sending more traffic their way. It's incredibly cheap," she said.

Kinchla said she wants Cignal to provide electronic billing that includes call details, and Cignal told her it is working on that. "I need that information to charge back to individual

impressed investors. "They are the gung-ho kind of guys who looked at a situation that everyone thought was impossible, and they thought it was simple," said Spencer Segura, senior managing director of corporate finance for Spencer Trask Securities. The venture capital firm has invested \$22 million in Cignal so far.

## In the beginning

Not everything has come easily to Perlman and Land, who met at Washington University in St. Louis. As undergraduates, they wanted to license a patent

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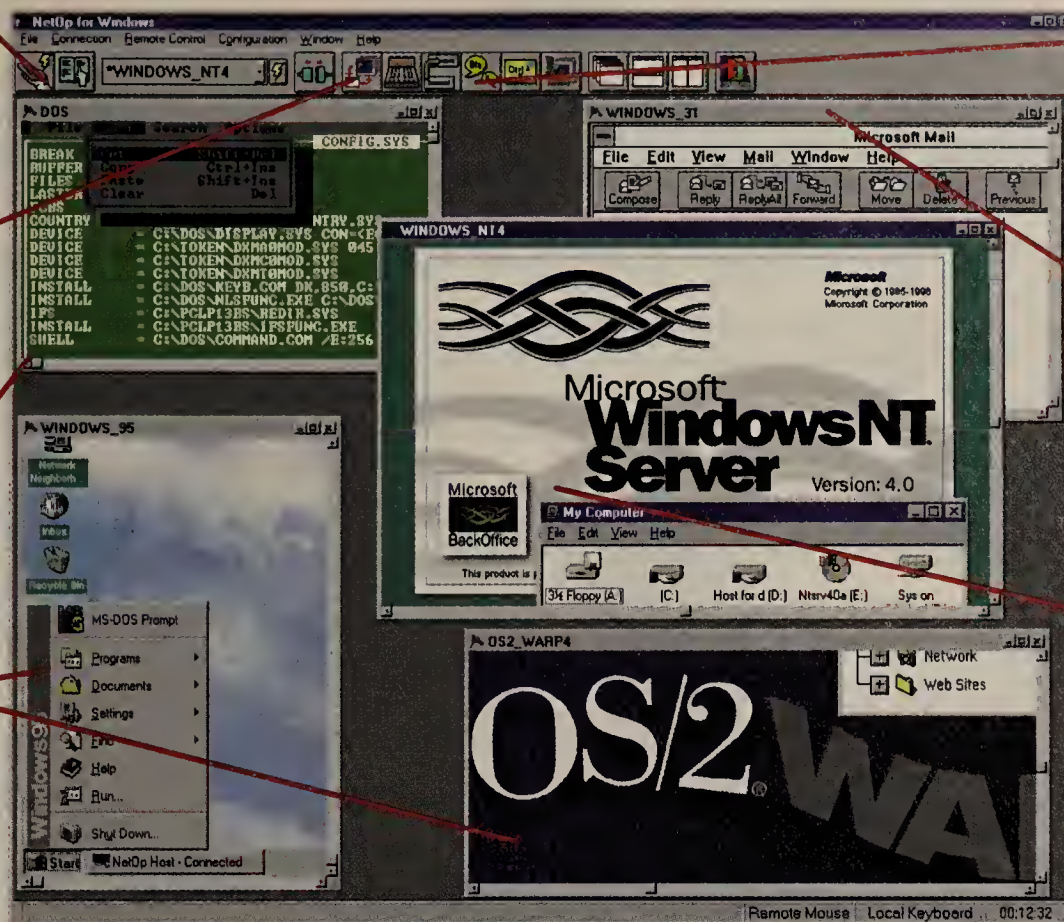
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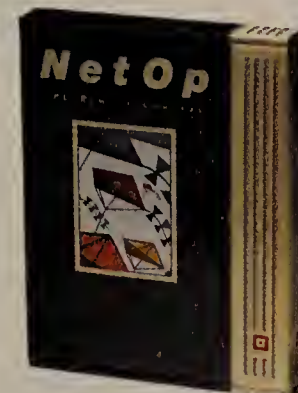
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# Buffer overflow bugs here to stay

*Recent Microsoft, Netscape software problems nothing out of the ordinary.*

By Andy Eddy

While Microsoft and Netscape may have fixed the recent bugs discovered in their respective messaging clients, users haven't heard the last of such buffer overflow-related problems.

Buffer overflow problems have actually been around for years, but the growing use of communications software and the Internet has resulted in glitches being discovered more often and given more attention, experts said.

Such problems are often relatively harmless, but they can create a scare when they affect

popular programs such as Microsoft's Outlook and Outlook Express and Netscape's Communicator (NW, Aug. 3, page 6). One security expert, A. Padgett Peterson, who works for a major U.S. Department of Defense contractor, referred to these recently discovered bugs as "the vulnerability of the week."

A buffer overflow occurs when a section of a computer's memory called the stack, which is designed to execute program commands, is written beyond its intended capacity. In many cases, this results in the crash of the computer or application that has suffered the overflow. While some instances are accidental, others are intended to exploit the weakness caused by the overflowed stack: A savvy hacker can insert malicious code among the data that causes the overflow, and this may in turn enable the code to execute on the computer, unbeknownst to the user.

Such code can introduce a virus or Trojan horse designed to accomplish any number of things, from stealing passwords to crashing the system or deleting files. Christopher Klaus, founder and chief technology officer at Internet Security Systems (ISS), a supplier of security management systems in Atlanta, said this approach may also enable a user with normal privileges to gain administrator-level control over a local network. By creating a buffer overflow in an application with "superuser" status, such as those that handle mail and File Transfer Protocol, the user may be able to carry out commands via a program normally unavailable to anyone with just low-level privileges.

## **Fixing the problem**

Solutions to buffer overflow problems can be difficult to pin down. For instance, since the Microsoft and Netscape client bugs were discovered, the companies have scrambled to release fixes for their respective programs. But it seems that for every overflow vulnerability that's discovered and patched in one program, researchers or hackers sniff out a new one.

One affiliate of L0pht Heavy Industries, a hacker collective

in Boston, constantly works on discovering such glitches in programs. A 21-year-old hacker who goes by the pseudonym



Buffer overflow problems have been around for years, and a complete solution to them will never be found, warned Eli Singer, president of Memco Software.

"DilDog" said that C++ and other programming languages used to create the bulk of applications today don't have ade-

quate boundary checking. This makes applications susceptible to overflow conditions, he said.

Much like solving the Year 2000 problem, it will take a concerted effort and some innovation by software companies and network managers to recognize vulnerabilities, seal up problem spots and prepare for the possibility of attack.

DilDog said that code checking is an essential process that's being overlooked. He claimed that use of existing tools — such as L0pht's own SLINT, a source code security analyzer that checks for security vulnerabilities and provides corrective recommendations — would catch 80% of the buffer overflows in software products before the programs go out the door to retail channels.

## **Need for Security 101**

If programmers were better trained, ISS' Klaus noted, fewer errors would be introduced into a product, resulting in cleaner applications and fewer security holes.

"Right now, there are very few universities teaching much about the deep technicals of everything you need to know

about security," Klaus said. "There are a few that teach cryptography, but they don't cover, 'Here's how people can break into your system and here's how to fix it.'"

Security companies such as ISS and Redwood City, Calif.-based Memco Software are striving to offer products and advice that limit the chance of attacks taking place as a result of buffer overflow.

For example, Memco President Eli Singer said the best solution may not be creating individual patches to programs each time such a vulnerability is discovered. Rather, customers would be better off with an application that monitors the system, varies the location of the stack and frequently clears the stack, he said.

Such a process makes it harder to exploit flaws and reduces the likelihood of network exposure on an ongoing basis, even if new programs are introduced to an individual PC or server.

"We've been trying to handle buffer overflows by fixing the programs," Singer said. "I don't think you can count on programs not having bugs." ■

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For entry details, go to [www.nwfusion.com/media/lounge](http://www.nwfusion.com/media/lounge).

The entry deadline is Sept. 1, 1998.

Good luck.

## IBM device boosts SNA/IP integration

By Marc Songini

Big Blue is writing yet another chapter in the book of SNA-to-IP migration.

IBM last week rolled out a new hardware device, dubbed Network Utility, that is capable of translating SNA to TCP/IP and vice versa for up to 40% less than a front-end processor or channel attached router. Priced at about \$3 per concurrent session, Network Utility clearly is aimed to compete with Cisco Systems' channel attached routers, which cost about \$5 per session, IBM claimed.

Network Utility will come in two models: the TN1 tn3270e Server for data center users, and the Model TX1 Transport for use in remote branch offices. Both models have two slots that can support Token Ring, Ethernet, FDDI or ATM LAN connections and Data Link Switching (DLSw), as well as LAN bridging protocols. DLSw lets SNA traffic flow over an IP backbone.

Both models can link directly to the mainframe via Enterprise Systems Connection or bus and tag interfaces. The devices run Network Dispatcher, IBM soft-

ware that provides load-balancing capabilities among multiple IP servers.

The TN1 tn3270e Server lets users offload tn3270 sessions from the host and can handle 16,000 concurrent sessions, according to Jim Goethals, enterprise solutions product marketing manager at IBM. That's four times as many sessions as IBM's 2216 router supports. The new

Utility will be a great tool for users looking to integrate TCP/IP and SNA. Mainord said this is the sort of tool she would consider integrating into her network, which has 180 remote sites and supports thousands of tn3270 sessions.

"I think we're no different than any other company — we're looking for different ways to access our legacy stuff. Taking

*"I think we're no different than any other company — we're looking for different ways to access our legacy stuff."*

Linda Mainord, director of applications services for the Memphis city school system



IBM device can also handle up to 500 transactions per second. Network Utility is a stripped-down 2216 designed to handle only SNA and TCP/IP sessions, Goethals said.

Linda Mainord, director of applications services for the Memphis city school system, is one user who thinks Network

the SNA protocol and trying to get it into a distributed TCP/IP network, and fitting all the new technology into that distributed network, are my biggest concerns," Mainord said.

The boxes will be available on August 28; the TX1 starts at \$15,000; the TN1 starts at \$29,500. ■

# Sun, IBM launch JavaOS for Business

By Chris Nerney

One of the major obstacles to the deployment of network computers (NC) may have been removed with the release last week of JavaOS for Business, analysts said.

Co-developed by Sun and IBM, JavaOS for Business is designed to offer independent hardware and software vendors a single operating system for developing and implementing Java applications that can run on NCs and thin-client devices such as kiosks and ticket machines.

The technology is based on JavaOS for NCs, currently offered with Sun's JavaStation. But JavaOS for Business features better server-based centralized management and provides a common management framework for JavaStations, IBM's Network Stations and other JavaOS-based NCs, Sun and IBM officials said.

The fragmentation of the NC market as vendors roll out machines based on their own operating systems has been cited as one of the main reasons the market has been slow to embrace NCs.

## A common approach

With JavaOS for Business, "we have a common operating system for all the myriad types of NCs that are getting produced," said Anne Thomas, senior analyst at Boston-based Patricia Seybold Group.

JavaOS for Business is a combination operating system/Java Virtual Machine that sits on the server. It is automatically downloaded once a client machine is turned on. One key new feature is the ability to easily load new device drivers, Thomas said.

"If you need to upgrade drivers on every single network computer out there, you can make one change, and that's on the server," she said. "And then the next time users boot up their machines, they get the new driver."

JavaOS for Business supports Java Development Kit 1.1.4 and runs on NT and Solaris servers.

By next year, Sun plans to replace the JavaOS for NCs operating system that currently is shipped with its JavaStation network computer. IBM also will use the new software with its own NC beginning in 1999.

A number of other vendors have announced they also will support JavaOS for Business, including BEA Systems, Lotus, Netscape, Oracle, Tivoli, Informix, Computer Associates and Sybase.

But another hardware vendor, Compaq, has claimed that JavaOS technology is limited and proprietary.

In a white paper outlining its Java strategy, the computer manufacturer argued that "JavaOS" association with open-standard Java technologies is

weak" and "Java technologies are already being integrated into other conventional operating systems to improve client manageability."

Along with Microsoft and Hewlett-

Packard, Compaq has criticized NCs as a poor solution for centrally managing networks and reducing ownership costs because they don't support enough existing applications. Compaq has

endorsed Microsoft's Zero Administration for Windows specification for central management and the updating of software on PCs connected to a LAN.

Last week Compaq announced it has signed an OEM agreement with Java applications server vendor Novera Software for Novera's line of jBusiness enterprise server products. ■

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# New appliances will focus on network connectivity

By John Cox

Some experts predict that in the coming years information appliances will become the most popular way to access the Internet, corporate networks and personally stored information. But it won't happen based on today's breed of palmtops, handhelds, Web boxes and set-tops.

Instead, a new souped-up and more connectable class of devices will emerge that may finally prove those pundits correct.

Many of the improvements will mimic those made in the PC world, including the addition of more RAM and storage, faster chips, and sharper displays.

But the most important developments, the ones that will make these tools attractive for corporate nets, will be in the area of communications. New communications features will include vastly improved wireless connectivity to the World Wide Web and corporate data networks, and improved access to data while on a network.

One emerging technology that promises to tie the appliances much more tightly to the desktop PC and network-based corporate resources is

Bluetooth, a short-range radio technology for voice and data transmission. Its backers, in-

cluding Ericsson, IBM, Intel, Nokia and Toshiba, hope to create a common specification that will let mobile devices of all types automatically exchange information with each other, as well as with peripheral devices and existing data networks.

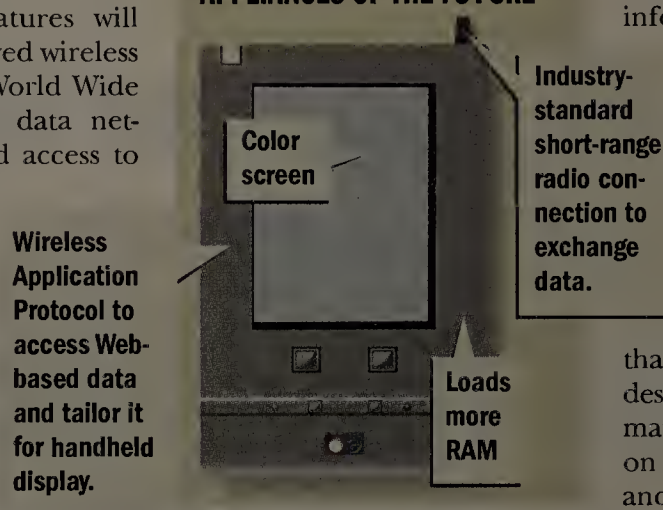
The Wireless Application Protocol Version 1.0 will also boost the communications capabilities of these devices. Now backed by more than 50 vendors, the protocol is designed to condense and reformat data for the small displays on handheld information appliances. "It's a protocol that lets

users request information from the Internet or corporate intranet, such as stock quotes or weather information," explained Randy Roberts, manager of business solutions for the newly formed Business Development Group at Nokia Americas. "But we want to get deeper into intranet information, such as product and price data."

As making connections and sharing information becomes easier, the need for synchronizing data in devices with corporate networks will become more urgent. Some products, such as 3Com subsidiary Palm Computing's PalmPilot and

See Connectivity, page 77

## APPLIANCES OF THE FUTURE



## RBOCs

Continued from page 1

erate deployment to reach more users as a result of the FCC proposal.

"It's a hollow victory for the RBOCs," said Michael Elling, a managing director for the telecommunications practice at Prudential Securities in New York. "This doesn't encourage RBOCs to build any more work-at-home applications or anything else."

The RBOCs agreed. "This action falls far short of the giant leap required to deploy advanced telecommunications services to all Americans," said Tom Tauke, senior vice president for government relations at Bell Atlantic.

### Forcing a plan

The FCC's proposal stems from petitions filed earlier this year by four of the five RBOCs. The petitions seized on the little-known Section 706 of the Telecommunications Act of 1996. Virtually ignored until this year, Section 706 forced the FCC to come up with a plan within 30 months of the act's enactment to ease regulations blocking the deployment of broadband data services. That deadline passed last week.

Under the FCC's proposal, RBOCs could move key digital-line equipment, such as DSL Access Multiplexers (DSLAM) and other electronics, into an "advanced network subsidiary." This subsidiary would not be regulated like an RBOC, which must open its switches and other

network gear to competitors. So the DSLAMs would not have to be offered to competitors, and the subsidiary would not have to offer DSL lines with a wholesale discount to resellers.

*"It's a hollow victory for the RBOCs. This doesn't encourage RBOCs to build any more work-at-home applications or anything else."*

Michael Elling, managing director for telecommunications practice, Prudential Securities

But bowing to lobbying from long-distance carriers, the FCC loaded up the proposed subsidiary with restrictions. Most notably, the subsidiary could not provide long-distance service for data transport — a key part of the RBOCs' Section 706 petitions — and would still have strict rules on letting competitors collocate their own DSL equipment (see graphic).

FCC Chairman William Kennard promised to turn the proposal into a final rule by February 1999 — a quick turnaround by FCC standards. "We should have a sense of urgency about this," he said. Pleading with lobbyists not to tweak the proposal to death, Kennard added: "What the American consumer wants is more bandwidth from multiple providers.

We really don't care who gets there first."

Numerous carrier officials questioned whether the proposal would achieve any of the objectives.

"We're concerned this proposal will actually delay the process," said an Ameritech spokesman. "We think this is adding more hoops to jump through, rather than removing them." Ed Young, senior vice president and deputy general counsel at Bell Atlantic, said the separate-subsidary requirement adds administrative costs instead of reducing them.

If the RBOCs didn't seem anxious to use their new proposed power, long-distance carriers wanted to make sure it didn't even get on the books. They claim that letting RBOCs out of resale requirements even with separate subsidiaries is unworkable.

### Too complex to help

"The phrase 'separate affiliate' is an oxymoron," said Jonathan Sallet, chief policy counsel in MCI's lobbying office here. "It's like paying yourself to park in your own garage."

Besides, the RBOCs don't need special rules to goose their DSL deployments, because they're already underway, argued lawyers for MCI merger partner WorldCom. Before the proposal was issued, WorldCom lawyers went to the FCC and dumped an 86-page stack of printouts from the Bells' Web pages extolling the RBOCs already announced DSL plans.

Users were likewise concerned that the FCC's proposal was too

complex to prove useful. "It's extremely confusing," said Scott Matluck, deputy director of telecommunications at the New York City Board of Education. "I can't fully understand who would gain from this one."

Matluck, who is president of the Communications Managers Association, a regional user group, said the qualification for giving RBOCs deregulated data services shouldn't be extra administrative rules that don't directly benefit users. Instead, the FCC should simply require

selling DSL services require two things: 10-by-10-foot spaces in RBOC switching offices to house their hardware, and access to the copper phone lines that go to customer sites, said Steven Gorosh, vice president and general counsel for NorthPoint Communications in San Francisco. Those two items are guaranteed under the FCC's proposal, if the RBOC sets up the separate subsidiary.

But some observers were concerned about an additional restriction: If the RBOCs set up separate subsidiaries, they will be ordered not to run any voice traffic over them. That addresses concerns voiced by AT&T and MCI executives in recent weeks that Section 706 could be a ruse to shake off regulations on ordinary telephony.

"This wasn't intended as a back-door way into long distance for voice," protested Bell Atlantic's Young. But he conceded that "once something is converted to ones and

zeros, how do we know what it is?" Added MCI's Sallet: "That's exactly the kind of problem that argues against the final adoption of the separate affiliate option."

Senior Editor Tim Greene contributed to this story.

## Ifs, ands and buts

The FCC's plan defining how RBOCs can set up deregulated subsidiaries includes many exceptions. For example, the subsidiaries:

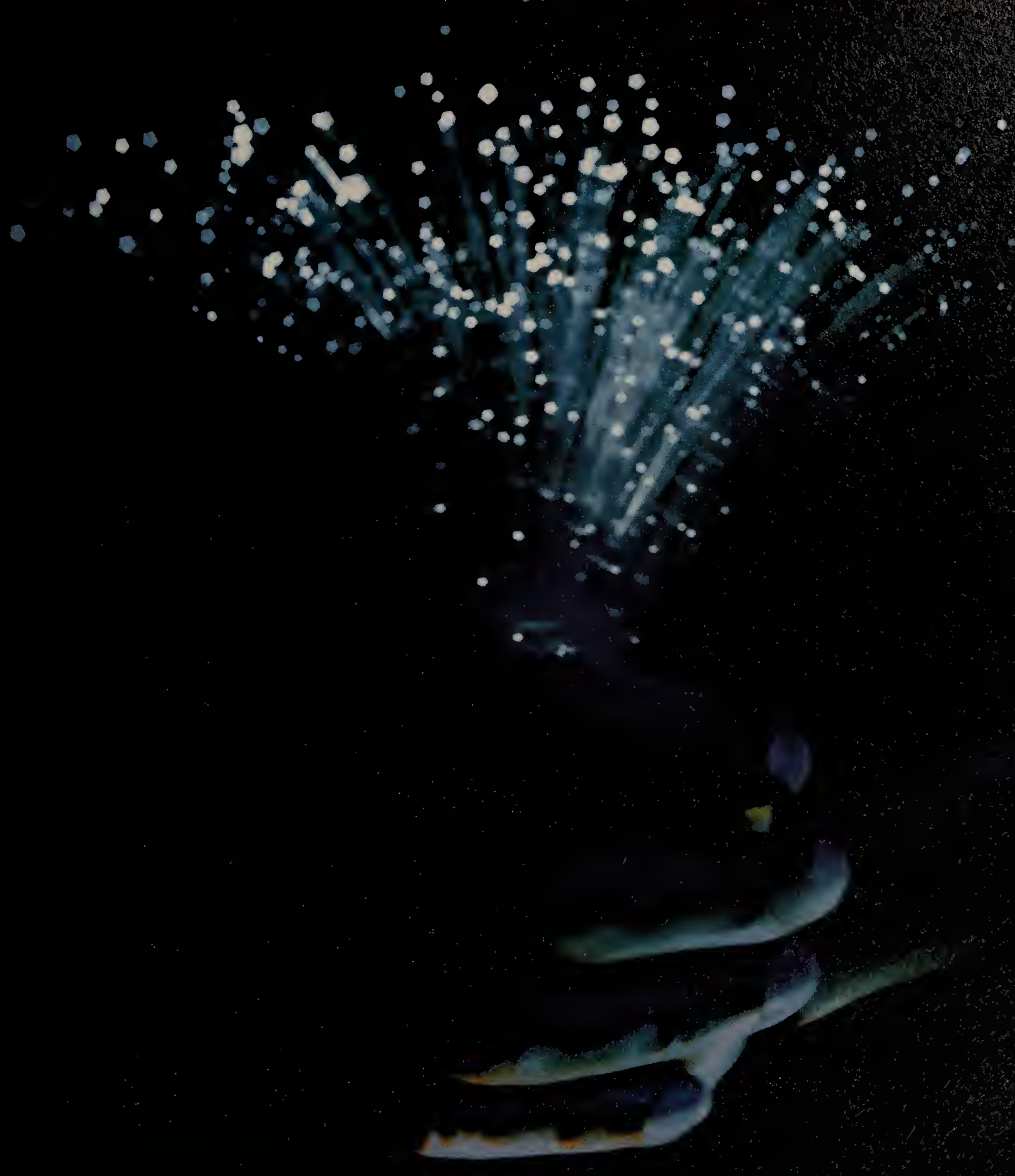
1. Cannot provide long-distance service until the RBOCs follow regular procedures to gain long-distance authority.
2. Must provide space in their central offices and a dry copper loop for competitors that are willing to provide their own DSL equipment.
3. May not provide integrated data/voice services.

that for basic services RBOCs meet "agreed-upon service levels for their main lines of business" and then allow them to offer deregulated advanced services.

One group of carriers — emerging competitive local exchange carriers (CLEC) installing their own DSL equipment but relying on the RBOCs for the last mile — professed to see some promise in the FCC's scheme. That's because CLECs

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\*Quoted from "First Looks", PC Magazine.

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# Local Networks

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## Briefs

### ■ Jato Technologies this week will introduce an Ethernet chip that will enable vendors to deliver 10/100/1000M bit/sec network interface cards (NIC).



Jato's JT1001 Network Accelerator

The Austin, Texas, company's hardware can boost network performance by handling

host offloading, packet bursting and checksum functions. Adaptec and Unisys are among the companies planning to use the JT1001 Network Accelerator on their NICs.

■ Novell last week said it has invested a total of \$10 million in four network software companies that make products that exploit Novell's NetWare 5.0 network operating system and Novell Directory Services. The capital comes from Novell's Internet Equity Fund, a \$50 million seed money fund set up last year.

The firm's investments include Evergreen Internet, a Chandler, Ariz., maker of electronic commerce products; GlobalCast Communications, a Fremont, Calif., vendor of multi-cast Internet software; NetPro Computing, a Scottsdale, Ariz., provider of directory services management products; and NetVision, an Orem, Utah, directory services integration firm.

■ Data General this week will announce a pair of Windows NT Avilion servers powered by Intel's new Xeon processors. The AV 3700 is a departmental server that includes up to four 400-MHz Xeon processors, each with 1M byte of cache and 4G bytes of memory. A rack-mountable version, the AV 3700R, can be used to anchor a network storage system. The servers, which start at \$7,500, will be available by the end of next month.

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## FastLane tries to make sense of directory mess

Active Directory Management Service to provide access to multiple directories across a network.

By John Cox  
Kanata, Ontario

FastLane Technologies is readying a revised version of its software that could help big companies rein in increasingly unwieldy enterprise directories.

San Francisco. "Directories are almost out of control at larger companies. Every time you put in another firewall, you put in another directory. The same with every new messaging system or Web server."

A simple example of the

compliant scripting tool can make standard COM calls to the services provided by this layer.

"What these guys are doing is creating a set of directory management services that insulate you from the complexities and differences of the

one NT domain to another. Abrams' team used Final to write a script that cut the passwords out of the old directory database and pasted them into the new one.

"The users got new NT accounts but they could use their old passwords," he said. "The whole migration was transparent to them."

FastLane President Jan Kaminski said he expects demand for Active DMS to grow as companies start planning their moves to NT 5.0 and Active Directory. A coordinated approach to directory deployment and migration will be needed, he said.

"The directory service will hold information not only about the network, but about network devices, applications, employees and so on," Kaminski said. "As a result, the directory service will be fundamental to the business: It must be always available and always accurate."

Active DMS will enter beta-testing next month, and general release is scheduled for year-end. Pricing has not been set.

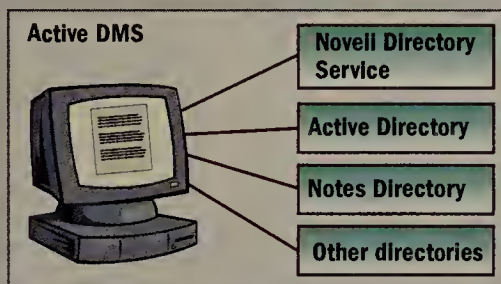
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### Cutting off access

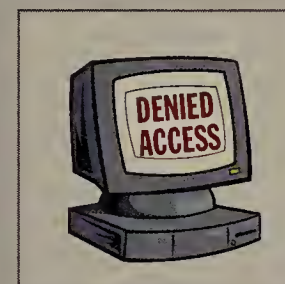
FastLane's Active DMS can be used to shut down network access to people leaving your company.



1. A net manager launches a security application to find all files relating to a departing employee.



2. FastLane's software — which includes rules engines, libraries and APIs — queries all enterprise directories on the corporate network.



3. The departing employee's permissions are revoked.

The company's Active Directory Management Service (DMS) creates a middle layer of software between directory management applications and the directories included with key platforms and applications, such as NetWare, Windows NT, Exchange and Lotus Notes. Users can employ FastLane's growing collection of applications or build their own programs for managing and tapping into data stored in multiple directories.

"Active DMS is probably going to save our bacon," said Dan Abrams, a consultant who is managing an NT domain reconfiguration project at Southwestern Bell Communications Directory Operations in

resulting complexity is what happens when an employee gets married and changes her name. The MIS group might have to manually sift through one or two dozen directories to enter the new name, Abrams said. Active DMS is designed to solve such problems.

### Inside Active DMS

Active DMS is a set of APIs and run-time software libraries running on one or more servers. This software tracks and reads the contents of existing directories.

FastLane enables those customers who choose not to use its management applications to write their own, using popular scripting tools such as Visual Basic, VBscript, Java and JavaScript. Previously, FastLane mainly supported its own scripting tool, dubbed Final.

FastLane is taking an object-oriented approach with Active DMS, Abrams said. That means Active DMS creates an object layer above the individual directories. This layer supports the Microsoft Component Object Model, which means any COM-

underlying, discrete directories," Abrams said.

### Proven technology

Abrams is already confident in FastLane after using the company's existing Final product to migrate 600 users from

### QUICK TAKE: FAST STARLET DUAL SPEED HUB/8

## Farallon helps iMac users get plugged in

Farallon, a division of Netopia, has introduced a 10/100M bit/sec hub designed to link Apple Computer's new iMac computers into LANs.



The autonegotiating Fast Starlet Dual Speed Hub/8 knows when to provide 10M bit/sec or 100M bit/sec to a user and can bridge between devices connected at either speed. The eight-port device is due to ship next month and will cost \$359.

Farallon complemented its hub announcement by introducing a network interface card for connecting iMacs to LocalTalk printers and other devices, including older Macintosh machines. The EtherMac iPrint Adapter LT features an RJ-11 LocalTalk connector at one end and an RJ-45 10Base-T connector at the other end. The card will ship next month and will cost \$99.

Farallon is also cutting the price of its EtherWave Printer Adapter from \$119 to \$99 until Sept. 30. This adapter can be used to link an iMac, another Ethernet-connected computer and a LocalTalk printer to one another, giving both computers printer access and the ability to share files with each other.

Farallon: (510) 814-5000

### Get more online:

- FastLane product overviews
- A review of NT domain administration apps
- User comments on Novell's NDS for NT.



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WIRED WINDOWS

## Learning from hackers

**T**he 2nd Black Hat Briefings security convention was held in Las Vegas a week or so ago, and just like last year (NW, Aug. 4, 1997, page 22), it was a weird, surreal mix of hackers, phreaks and corporate suits and ties. The suits

paid \$1,000 each to have the hackers tell them about the security holes in their products and networks. On reflection, that's a lot cheaper than hiring a consultant to do a security audit, isn't it? Especially since the hackers speaking at the conference are also among the highest paid security consultants around — and probably worth every penny.

The real fun began the day after Black Hat, though, when Def Con started. This sixth gathering of "Hackers, Phreaks, Hammies, Virii Coders, Programmers, Crackers, Cyberpunk Wannabees, Civil Liberties Groups, CypherPunks, Futurists, Artists, the Criminally Insane and the Hearing Impaired" is a lot more like what you'd expect a gathering of the legally challenged to be. Leisure activities included "Spot the Fed" and "Spot the Screenwriter" contests (winners got T-shirts). Speaker topics included major computer crimes from the past year; tools of spying such as dead drops, semaphores and cut-outs; hacking the travel industry; a two-year effort in massive multimodem war dialing; and "Hacking the Big Iron — Security Issues in Large Unix Environments."

One of the announcements at Def Con was "BackOrifice," a hacker's bag of tricks from The Cult of the Dead Cow. BackOrifice is a product euphemistically described as a remote Windows administration tool.

BackOrifice allows the user to control and monitor computers running the Windows operating system over a network. It includes a keyboard monitor to trap password entries; an HTTP server to allow uploads and downloads of files to and from a machine on any port using any HTTP client; and a packet sniffer that allows easy monitoring of network traffic.

BackOrifice also allows connection redirection, in which connections are bounced off one machine to any other machine on the Internet, thus hiding the actual source of the connection. It can be attached to another executable, just like a virus, and will install itself when the application is run. But BackOrifice won't show up in the Windows task list, so the user has no way of knowing it's running.

I can't decide if BackOrifice is really a hackers' tool or something the FBI (or the National Security Agency) commissioned to find ways around privacy and security issues. Could the entire hacker community be just a front for the government?

*Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at wired@vquill.com.*



Dave Kearns

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### Tip of the week

Robert Bork, the former Supreme Court nominee who's now a consultant to Netscape, has written an excellent white paper outlining the basis for an antitrust case against Microsoft. The 7,000-word document is light on legal jargon and fairly easy to read. I've put a copy at <http://vquill.com/borkdoc.htm>.



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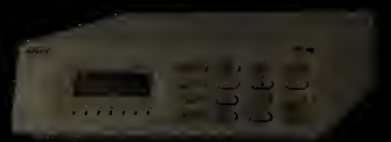
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# Internetworks

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## Briefs

■ **Frame Relay Technologies** recently announced its **FrameSwitch Office frame relay access switch** for corporate users. The device can prioritize remote traffic into four qualities of service based on IP source and destination addresses. The box performs Ethernet and frame relay switching and supports Layer 3 IP switching. It



Frame Relay's FrameSwitch.

has 23 10/100M bit/sec Ethernet ports for connecting LAN devices and seven slots for T-1, fractional T-1 or voice connections. FrameSwitch supports voice compression for reducing the bandwidth needed to carry voice traffic from a corporate PBX. Available now, the base FrameSwitch unit costs \$2,995. WAN cards cost \$300 to \$500 each.

© Frame Relay Technologies: (714) 668-0222

■ **Cisco Systems and PeopleSoft** last week said they will develop technology that will speed the flow of PeopleSoft application data over Cisco router-based networks.

Under a multiyear joint research and development agreement, the companies will try to make PeopleSoft's financial and human resource management enterprise applications more network-aware, while making the management software included with Cisco's routers more aware of PeopleSoft's applications.

PeopleSoft said it will integrate its applications with Cisco's upcoming CiscoAssure Policy Networking product. Company executives declined to say when the alliance will result in tangible products.

© Cisco: (408) 526-4000; PeopleSoft: (510) 225-3000

## Cisco to use SNA as weapon against competition

By Jim Duffy

Cisco Systems' plan to use SNA as a competitive advantage over Lucent Technologies and Nortel hinges on providing acceptable response time for the IBM data in a multiservice IP network.

Cisco believes its experience in melding SNA and IP internetworks can be used as a weapon in the company's battle with Lucent and Nortel for leadership in converging voice, video and data over IP networks. SNA is a unique component in Cisco's enterprise network repertoire that the telecom giants cannot match, the company claimed.

"We're going to use that big time against Lucent and Nortel," said Frank Maly, director of marketing for Cisco's Internetworks business unit.

Lucent has virtually no experience in SNA internetworking; Nortel is about to inherit some when its multibillion dollar acquisition of Bay Networks goes through. But Bay had just over 5% of the market share in SNA routers last year, com-

users to set IP precedence bits in the headers of those packets to establish priority, bandwidth reservation and other class- and quality-of-service (QoS) characteristics for SNA data.

Cisco has performed internal tests of SNA response time over multiservice nets using the QoS features of Cisco IOS, including priority queuing, custom queuing and the Resource Reservation Protocol. The tests included Cisco's 4500 and 3600 routers with voice-over-IP cards, the company's IP/TV multimedia application on Windows NT 4.0, and Ganymede Software's Chariot SNA and Chariot performance testing applications.

The tests simulated 10 to 20 SNA interactive users in one transaction per minute, in which 100-byte requests initiated 1,500-byte responses. Those sessions contended for bandwidth with 12K voice on a 64K bit/sec

link, 1.5M bit/sec MPEG video and audio, and between 10 and 80 competing File Transfer Protocol (FTP) file transfers. Congestion occurred on the outbound — central office suite to remote — 64K bit/sec and T-1 links.

Over a 64K bit/sec link with 20 FTP sessions, Cisco claimed to have maintained subsecond SNA response time. Voice/telephony and IP file transfers also performed within specifications, Maly said.

Cisco will unveil hardware and software over time that will allow users to establish SNA class of service and QoS policies for multiservice networks, Maly said. One such product is Version 2.0 of Cisco IOS for S/390 software, which allows users to set IP precedence bits for SNA traffic (NW, July 27, page 1).

Cisco may also extend voice

support to its 7500 and 12000 series routers, and Catalyst 8500 switching routers.

"We will have high-end equipment that will be the head end of voice [networks]," Maly said.



Cisco's Maly said the company will use SNA "big time."

These devices will strip the voice out of an IP packet, he said.

© Cisco: (408) 526-4000

## Attachmate wants to play VPN game

By Tim Greene

Bellevue, Wash.

Better known for its SNA connectivity products, Attachmate last week made a move on the virtual private network (VPN) market with new software that will enable secure remote communications.

Attachmate announced Remote LAN Node (RLN) Security Services software that offers authentication and encryption to secure corporate transmissions to and from remote users via the 'Net.

RLN Security Services supports RSA public key authentication as well as 40-bit Data Encryption Standard (DES) encryption. Attachmate also offers Enhanced Security Services, which features stronger RSA and 168-bit DES 3 encryption.

### Additional options

Both software options can be added to Attachmate's existing RLN server software to beef up security, according to Michael Lackey, director of product

management for Attachmate's specialty products.

Even with the security enhancements, RLN is still a direct dial-up remote access product. But in the first quarter of next year, Attachmate will add support for

that can perform authentication and encryption, Lackey said.

The software runs on any Pentium-based PC running Windows NT server. The CPU powers the encryption, so performance of other applications on the server will take a hit, Lackey said.

Attachmate does not yet have a measure of how severe that power draw is, he said.

Even so, the added security might be worth the power drain, said James Jennings, network engineer at Options Clearing in Chicago.

"We might look at it for a VPN," but that would first entail coordinating with an Internet service provider, he said.

Pricing of RLN Security Services starts at \$8,565, and RLN Enhanced Security Service starts at \$12,850.

Attachmate is also introducing RLN Access Server, a hardware module that supports 24 56K bit/sec modems.

© Attachmate: (425) 644-4010

### ATTACHMATE BOOSTS SPEED AND SECURITY



#### Attachmate's RLN Access Server

**Software:** Now includes DES 3 encryption

**Hardware:** Option for cards that each support 24 56K bit/sec

Internet tunneling, so remote users will be able to dial a local ISP, then reach a corporate site via a secure Internet connection.

RLN also features a client

### Get more online:

- Overviews of Cisco's and IBM's SNA strategies and products
- An SNA overview

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pared with Cisco's almost 80%, according to International Data Corp., a market research firm in Framingham, Mass.

Nevertheless, Cisco's challenge will be to ensure that SNA data does not get shortchanged on bandwidth when it's running over the same network as voice, video and IP data, commonly referred to as a multiservice network. At the same time, Cisco must provide adequate response time for delay-sensitive voice and video traffic.

To do this, Cisco first will encourage users to converge their SNA and IP networks, and run SNA encapsulated in IP packets. Cisco will then allow

INTERNETWORKING MONITOR

# In defense of Jumbo Frames

**I**t's no secret that there are many critics of Gigabit Ethernet Jumbo Frames, but most of the criticism is based on flawed arguments.

The reason for Jumbo Frames — frames larger than Ethernet's standard 1,518 bytes — is simple: Larger frames mean lower frame rates. In the case of

Gigabit Ethernet, wire-speed throughput at 1,518-byte frames means servers face a torrent of more than 80,000 packets — and 80,000 interrupts — per second. That's enough to bring many multi-processor platforms to their knees. Jumbo Frames, in contrast, reduce the rate by more than 80%.

Jumbo Frames' detractors have prof-

ferred three claims that, if true, would relegate the technology to failure.

**Claim: You'll have to retrofit the entire network.**

Using jumbo frames on Gigabit Ethernet does require configuring the network, but we're not talking wholesale changes. It means containing the larger frames within the Gigabit Ethernet segments — for example, those between servers — and using smaller frame sizes when bridging to 10/100M bit/sec Ethernet.

Remember, FDDI has long served as a backbone for 10M bit/sec Ethernet. Customers didn't "retrofit" their Ethernet gear to accommodate FDDI's larger frames; they simply confined the larger frames to the FDDI LANs and used smaller frames when connecting to Ethernet.

**Claim: The server should be upgraded, not the network.**

There's benefit to upgrading both. It's true that upgrading servers with faster buses, more powerful CPUs, more memory and faster adapters will almost always improve performance. It's also true



**John Curtis**

that using Jumbo Frames, with their corresponding lower frame rates, will improve performance. These tactics are complementary, not mutually exclusive.

Upgrading the Gigabit Ethernet network can help your ATM servers, too. Recent tests by The Tolly Group have shown that larger frames and lower packet rates enhance ATM LAN Emulation performance (see document 8277 at [www.tolly.com](http://www.tolly.com)). That means you'll probably want to configure larger frames on your ATM servers to optimize performance.

**Claim: There is no benefit in mixed 10/100/1000M bit/sec networks.**

Customers who use IP and Layer 3 switching can perform IP fragmentation between Gigabit Ethernet and 10/100M bit/sec LANs. This lets the server handle lower packet rates and still allows connectivity to legacy endstations.

It works like this: Whenever the server transmits jumbo IP packets toward the 10/100M bit/sec LANs, the packets are fragmented by Layer 3 switches as they propagate onto the legacy Ethernet LANs.

As long as there are network devices that can't support Jumbo Frames, there will be network equipment vendors to fault the technology. In the meantime, look for vendors with products that support jumbo frames, and ask those vendors about the potential merits of the technology.

Curtis is a senior engineer/analyst with The Tolly Group, a strategic consulting and independent testing firm in Manasquan, N.J. He can be reached at (732) 528-3300, [jcurtis@tolly.com](mailto:jcurtis@tolly.com) or [www.tolly.com](http://www.tolly.com). Curtis is filling in for Kevin Tolly, who is on vacation.

# GETTING TO GIGABIT

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Join industry gurus Kevin Tolly, president of The Tolly Group, and John Gallant, editor in chief of *Network World*, along with representatives from the leading Gigabit Ethernet vendors as they examine the issues surrounding this exciting new LAN technology. Get answers to your Gigabit Ethernet questions and more at the Network World Town Meeting Getting to Gigabit. Plan now to attend this FREE SEMINAR and give your network a bandwidth boost.

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8:00 - 9:00 Registration and Continental Breakfast  
9:00 - 9:30 Segment 1 — LEVEL SET  
9:30 - 10:30 Segment 2 — THE DECISION DRIVERS  
10:30 - 11:00 Break and Product Information  
11:00 - 12:15 Segment 3 — GIGABIT ETHERNET STRATEGIES  
12:15 - 1:15 Complimentary Lunch and Product Information  
1:15 - 3:00 Segment 4 — TECHNICAL ISSUES AND OPTIONS  
3:00 - 4:00 Segment 5 — THE FUTURE

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# Carriers & ISPs

Covering: The Internet • Interexchange and Local Carriers • Wireless • Regulatory Affairs • Voice Equipment

## Briefs

■ **E-Parcel**, the Federal Express of electronic file distribution, has announced it is now using **NaviSite's Site-Harbor Web Hosting services** to support the company's offerings.

E-Parcel offers business users secure electronic file transfer services.

Because E-Parcel requires high bandwidth access to the Internet and reliable security and management, the company moved its servers to NaviSite's Web hosting facility, said Hiroshi Kobata, E-Parcel president and CEO. Kobata said the company's previous national service provider could not keep up with E-Parcel's growth.

© E-Parcel: (617) 964-5566

■ **MCI** has snapped up a majority stake in **Brazil's newly organized long-distance company, Embratel.**

The U.S. carrier made the move late last month after the Brazilian government divided the state-owned dominant carrier, Telabras, into various units and began selling them separately on the Rio de Janeiro stock exchange.

Many of the former Telebras divisions, including Embratel, will provide local exchange service in various regions of Brazil.

■ **At least two state telecommunications regulators** have written to the Federal Communications Commission protesting its recent move to add another surcharge to residential and business phone bills. The charge will be up to \$1 per line for local telephone number portability.

The fee is due to appear on phone bills next February in areas where portability is available. New York and Florida regulators told the FCC the states should decide whether a fee is necessary because portability is rolling out state-by-state on a very slow schedule (NW, April 13, page 1).

## Ascend buys clout in carrier markets

By Tim Greene  
Alameda, Calif.

Ascend Communications is becoming one of the key players in building carrier networks of the future.

With its purchase last week of Stratus Computer, Ascend now has the ammunition to build less expensive carrier networks, unclog Internet access bottlenecks and deliver services carriers could not offer before.

The networks that carriers build with Ascend and Stratus technology will offer more features and reliability, which could encourage corporate users to outsource more of their networks to service providers, said Ken Fehrstrom, vice president of strategic business development for Ascend. And because the new networks will be less

expensive to build, customers can also look forward to lower prices, he said.

The two companies have already teamed to unclog access for users dialing in to the

### The math in the Ascend/Stratus deal

#### Ascend:

Core ATM and frame relay switches (GX 550, CBX 500 and BSTDX)



#### Stratus:

Fault-tolerant computers and telephone signaling software



**Backbone hardware that carries voice and data traffic that can talk to existing voice networks.**

These new capabilities will come about by Ascend's melding of Stratus' telephone signaling software, operations systems software and fault-tolerant computers with Ascend's access and switching gear.

Internet. Ascend MAX TNT access switches endowed with Stratus voice telephone signaling intelligence can identify data phone calls and divert them to data switches in the carrier network.

The combined technology helps clear congested voice switches by directly feeding sites that receive high volumes of data calls, such as ISPs' points of presence. The alternative is to beef up the voice switches, a tactic which is about 10 times more expensive than the Ascend/Stratus option, according to Frank Dzubeck, president of Communications Network Architects in Washington, D.C.

Together the two companies have built congestion relieving gear that is being evaluated in the labs of major carriers. The carriers include MCI, SBC Communications, BellSouth, NaviSite, Teleport Communications Group, France Telecom and Deutsche Telecom, according to Stratus CEO Bruce Sachs.

Stratus also makes service control point software that establishes service features such as 800 and 900 number calls, follow-me phone numbers and virtual private networks. With those types of features blended into data networks, carriers could offer new data services.

In addition, Ascend plans to give Stratus intelligence to its backbone packet switches so the switches can function as if they were voice network trunking switches, Sachs said. The Ascend switches would cost just a fraction of what traditional voice switches cost, a factor that might help pressure carriers into lowering prices, Dzubeck said.

The purchase puts Ascend in direct competition with traditional voice switch vendors Lucent and Nortel. It also puts Ascend in a better competitive position against Cisco, which recently bought Summa 4 for its phone signaling technology (NW, Aug. 3, page 11).

See Ascend, page 26

## UUNET pushes the SLA envelope

ISP offers aggressive 'Net performance guarantees — with a twist.

By Denise Pappalardo  
Fairfax, Va.

Reliability is the cornerstone of any good Internet access service, and that's what UUNET Technologies is trying to deliver with its latest service-level agreement (SLA) enhancements.

UUNET, a WorldCom subsidiary, is raising the bar on standard SLAs that address network availability, minimum latency and network outage notification.

The ISP is guaranteeing 100% network availability for all of its dedicated frame relay, 56K bit/sec, T-1, T-3 and OC-3 Internet access service customers that sign up for a one-year contract.

"SLAs without compensation are empty promises," said Alan Taffel, vice president of marketing and business development.

Business users will be hard pressed to find standard SLAs from any ISP that are this aggressive, said Melanie Posey, a research manager at International Data Corp., a Framingham, Mass., research and consulting firm.

The new guarantee means that if UUNET's network is

unavailable for even 30 seconds, users will receive a one-day service credit. This SLA also covers a customer's local exchange carrier connection to UUNET's net.

UUNET is also promising that customers will not experience more than 85 msec round-

trip latency guarantees available today, UUNET is not backing up this guarantee with adequate compensation. "It's kind of freakish the way the latency guarantee works," Posey said. The 85 msec minimum latency guarantee is actually a monthly average, so if UUNET does not meet that guarantee on average for one month, then the ISP has another month to fix the problem, she explained.

If the second month passes and UUNET still hasn't met the guarantee, customers are compensated with a one-day service credit. However, more than 60 consecutive days of less-than-

robust service is too many days for most business users.

The company is not offering customers any special tools to monitor latency on its backbone today, Taffel said. "We will post the latency figures on our Web site every month," he said.

The new SLAs are available now.

© UUNET: (703) 206-5600



trip latency over its domestic network. And for traffic that travels internationally through UUNET's New York based-hub to London, the ISP is guaranteeing that users will not experience more than 120 msec of round-trip latency.

But hold on to your purse strings: While 85 msec is one of the most aggressive minimum

### Get more online:

- A look at Ascend's acquisition of Cascade Communications.
- The latest Ascend financial and stock news.

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## EYE ON THE CARRIERS

## We support universal service, even if we don't offer it

**I**f you or your company's employees are having trouble getting all the local phone lines you need, take a moment to shed a sympathetic tear for Harold and Evelyn Chamberlain of Hendersonville, N.C.

Hendersonville is a small, resort-oriented community in the hills of western North Carolina. On a recent vacation visit there, I read in the local paper about the plight of Harold and Evelyn Chamberlain. They moved to Hendersonville on July 16 and as of this writing still don't have a phone line to their home.

The Chamberlains are in their 70s and suffer medical problems. In addition, Evelyn's father is 93 and lives alone in Virginia. "I need to check on him all the time," Evelyn told the *Hendersonville Times-News*. "But I can't call him now."

BellSouth actually gave the Chamberlains their phone number three weeks before they moved, but the phones didn't work when they moved in and they still don't. When the local paper inquired, BellSouth said, "Well, whaddya know. All the cables in the Chamberlains' area are used up. We'll have to go there and install some new trunks."

Corporate telecom managers will recognize this as the dreaded "special con-

struction" exception regularly rolled out by local exchange carriers. If you ask for an ISDN or, heaven forbid, a digital subscriber line (DSL) that's more than a hop, skip and a jump from the central office, you may have to pony up hundreds of dollars to help the giant carrier install the lines or equipment. But the Chamberlains weren't asking for ISDN or DSL or Synchronous Optical Network (SONET). They weren't looking for a second or third line for Internet access, a fax machine or a gabby teenager. This wasn't even their vacation home. This was their basic analog phone line. Right now, if they have to make a phone call, they go downtown and find a pay phone.

What's ironic here is that BellSouth is probably the biggest bellyacher to the regulators when it comes to the issue of universal service. Because only the Bells have a true commitment to serve customers in out-of-the-way areas, they claim, the government had better not take away the subsidies largely passed through to business users that make remote service possible.

Even worse, BellSouth has been one of the carriers most active in backing ridiculously transparent "grass-roots" coalitions that are pawns for their lobbying positions. My favorite has always been "Keep America Connected!" — a front group whose position is that people all over the country will lose communications if the Federal Communications Commission introduces unsubsidized competition nationwide. Gee,

maybe Harold and Evelyn Chamberlain would have to wait a year for a phone line rather than a few weeks if it weren't for groups like that!

The regulators are all located in the highly profitable metropolitan cocoon of Washington, D.C. So what they don't get to hear is the fact that all carriers — new or old, dominant or otherwise — make investment decisions based on whether there's enough of a critical mass to serve an area.

If you're asking, "What's wrong with that?" I might say, "Nothing at all." But the Bells can't have it both ways. If they keep

getting a per-minute tribute on both ends of every long-distance phone call — and keep asking for it on every dial-up Internet connection — they'd better put that money to good use.

*Rohde is a senior editor with Network World. He can be reached at [drohde@nwu.com](mailto:drohde@nwu.com).*



David Rohde

## Ascend

*Continued from page 25*

Ascend CEO Mory Ejabat predicted this year the company would sell more switches to new carriers building networks for the first time. The new carriers are not burdened with traditional circuit-switched networks and can embrace Ascend's new gear wholeheartedly. Williams Network and Qwest, two of the major new national long-haul carriers, are basing their networks on Ascend gear.

Ascend sells primarily to ISPs and competitive local exchange carriers (CLEC). Stratus sells mainly to established carriers, including 26 of the 30 largest telecom companies in the world. Combined, the two companies have a better chance of selling to ISPs, CLECs and traditional carriers, Ascend's Fehrnstrom said.

Ascend said it has no interest in Stratus' enterprise systems unit or in its financial or enterprise software units, which it plans to sell off before year-end. ■

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# Intranet Applications

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## Briefs

■ Security vendor **nCipher** this week begins shipping the nFast/CA cryptographic accelerator.



nCipher's nFast/CA

ator, a Web server plug-in module that speeds digital-certificate processing to up to 300 1,024-bit key public signings per second.

The nFast/CA accelerator, which costs \$15,000, supports standard protocols including Secure Sockets Layer, Transport Layer Security, Secure Electronic Transaction and Secure Multipurpose Internet Mail Extensions.

© nCipher: (978) 691-6487

■ **Opera Software**, the Norwegian company that makes the diminutive Opera browser, has announced it will be releasing **Version 3.5** of the product within the next month. Opera has received a lot of attention from the Web community as an alternative to Microsoft's Internet Explorer and Netscape's Navigator browser or Communicator client suite.

Currently, Opera Version 3.21 is a little more than 1M byte, small enough to fit on a floppy disk. Version 3.5 will include support for cascading style sheets and various plug-ins, including Java support through Sun's Java plug-in.

■ **Internet auction site start-up FairMarket, Inc.** is offering companies their own business-to-business auction sites at [www.fairmarket.com](http://www.fairmarket.com).

The new service gives sellers their own online spaces, where they can describe their companies and add corporate graphics and links to an existing corporate site. Service packages start at \$19.95 per month.

## In - Site

# University directories go to head of the class

By Paul McNamara  
Madison, Wisc.

If connecting disparate directory services was as simple as dialing 411, Keith Hazelton might find himself out of a job.

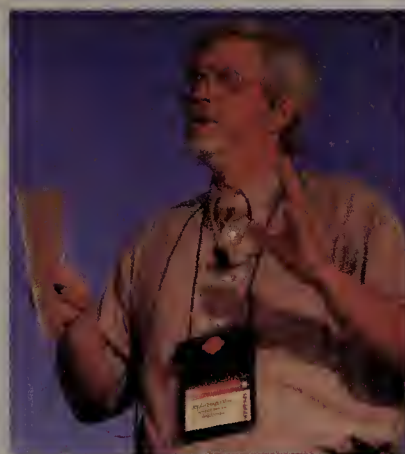
Instead, the IT architect at the University of Wisconsin-Madison has been up to his elbows for more than a year in an enterprise directory project aimed at halting the type of directory sprawl that plagues his campus and so many other organizations. While Hazelton and his fellow planners are in the early stages of working through the myriad issues involved, they are pleased with the initial buy-in exhibited by university administrators and IT rank and file.

The Madison campus has 40,000 students, 15,000 faculty and staff, and thousands of "others" who require access and security rights to various applications, facilities and privileges such as library checkout. Toss in the ever-growing alumni rolls, and it is easy to see why the student systems alone contain more than one million entries. Today, the campus has at least 18 separate directories, and the interaction between them — and those who run them — is rather limited and inefficient.

While Hazelton is not con-

vinced that all 18 directories need to be maintained long-term, whittling the number down is not among his top priorities for the new University Directory Service (UDS).

UDS will initially handle



Hazelton straightens directory clutter.

two applications: student photo ID information and employee benefits administration. One goal of the latter is to let workers handle some tasks themselves through the use of Web browsers.

From this base, Hazelton hopes to convince a number of those responsible for the 18 existing directories to latch onto this new enterprise directory service for some or all of their data entry and maintenance. For example, a stu-

dent's name, home address and telephone number could be entered only once at the enterprise directory level and replicated to all other directories needing that information, thereby saving time and money.

"It puts the wrong spin on the project to say that the goal is to just whack away [at the total number of directories]," Hazelton said. "It's much easier to say that the goal is to keep us from having to generate 12 more directories over the next five years."

By easier he means, in part, easier politically. Directory managers are very protective of their data, Hazelton said, and often for very good reason. While some sensitive data requires close control, such as student health records, other types of more routine information can be entered once into an enterprise directory and replicated to other directories as needed, he said.

The pilot, built on Netscape's Directory Server and Lightweight Directory Access Protocol-based technology from Innosoft, is budgeted for \$70,000. Technology choices have yet to be made for the production system, which is expected to cost between \$150,000 and \$200,000 when

deployed in December.

Hazelton expects to see other department directories brought into the system, such as the directories for the registrar's office and the library.

However, he does not believe that a single all-inclusive enterprise directory is possible or desirable, given the variety of needs on campus. Halting the growth and fostering an effective exchange of data among directories is a big enough job, he said.

Hazelton cautions directory planners to be mindful of hidden costs that do not necessarily appear on a budget plan for such a project. For example, he said some three dozen volunteer professionals contributed four to six hours per month — all unpaid — for 15 months during the initial planning process. ■

## Get more online:

● Advice on choosing a next-generation directory.

● A look at the role of directories in application and device management.

[www.nwfusion.com](http://www.nwfusion.com)

# Ralph Ungermann logs on to the 'Net with acquisition

By Chris Nerney  
Santa Clara, Calif.

Industry vet Ralph Ungermann is making a few changes at his network video company First Virtual. In a move deeper into Internet territory, First Virtual recently snapped up IP Multicast start-up ICast for \$8 million.

First Virtual also changed its name to the more 'Net-sounding FVC.COM. Officials said the new name reflects the company's emerging role as an Internet video applications

provider.

Because ICast used IP as its basic protocol, the purchase gives FVC.COM access to a global market of 100 million Internet-enabled PCs, company officials claimed.

FVC.COM was founded in 1993 to build hardware and software to deliver video over networks. Its products include switches, video caching devices for storage, and software for transmitting video over ATM and Ethernet.

The company recently began

repositioning itself as a vendor of products for the Next-Generation Internet (NGI), a federal project to build a high-speed network for advanced applications used by the academic community and government research agencies.

ICast, founded in 1995 and based in Los Gatos, Calif., makes IP Multicast software designed to allow audio, video and high-volume data transfers over the Internet and intranets.

IP Multicast can deliver

voice, video and text from one sender to many recipients or from many senders to many recipients.

The acquisition is expected to be finalized this month.

In its last financial statement as First Virtual, the company eked into the black for the first time, posting a \$121,000 profit on revenue of \$11 million for the second quarter of 1998, compared with a loss of \$1.3 million on \$3.4 million in revenue in the second quarter of '97. ■

## NET INSIDER

## Getting smaller by getting bigger

**I** was not there at the start of BBN's network business, but I was an instigator of the organization's restart. Now it's hard to tell if BBN's net-

work business is starting again or entering the beginning of its end.

BBN, once known as Bolt Beranek and Newman, was the first Internet ser-

vice provider.

In the beginning, the Internet was called the nationwide ARPANET, and starting in 1969, BBN ran the ARPANET under contract from the U.S. government.

Peaking at only a few hundred sites, the ARPANET started to fade away by the late 1980s, replaced by fast-growing

regional data networks interconnected with the NSFnet.

In this same time frame, it became clear to a bunch of us techies at Harvard, Boston University and Massachusetts Institute of Technology that we could put together one of these regional networks of our own. We wanted to call it the NorthEast Regional Data NETWORK, but the powers that be objected to the acronym and settled for the name NEARnet. While we wanted to be involved with the network's details, we did not want to run it and selected BBN to do so.

This began the second phase of BBN's involvement in the Internet. The company eventually bought NEARnet and a number of other regional networks, formed BBN Planet, and became one of the largest ISPs in the U.S.

But a large ISP is still small potatoes in the telecommunications world, and BBN became an attractive trinket that was snapped up by GTE in mid-1997. BBN is now externally visible thanks to a "Powered by BBN" tag line used in some of GTE's advertising.

GTE Internet-working, BBN's new guise, is still one of the largest ISPs. The company is holding its own against the likes of UUNET, MCI and Sprint.



**Scott Bradner**

Then along comes the announcement that GTE is about to merge with Bell Atlantic, with GTE's Internet prowess noted in the press releases as a key asset of the new combined company. I have to admit that I worry about my friends at whatever will be left of BBN when it's buried deep inside a traditional local telephone company.

Traditional telephone companies have demonstrated a remarkable inability to understand the Internet. Their fears, misunderstandings and assumptions could fill a black hole. In general, considering carriers' levels of understanding, they can be said to possess an excess of "anti-clues."

With all of its history, BBN is one of the more clued-in ISPs. But I fear that when BBN comes in contact with Bell Atlantic, the result will be clue annihilation.

My friends may be strong enough to overcome their fates as internal Bell Atlantic body parts. But my concern is that they will disappear into the morass or feel they have to escape from the land of the living Dilbert cartoon, and what was BBN will fade away without even a whimper.

Disclaimer: Harvard tends more to bravado than whimpering, but the above is my own worry.

*Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@harvard.edu.*

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# Technology Update

Covering: Evolving Technologies and Standards

## NETWORK HELP DESK

Ron Nutter, a Master Certified Novell Engineer and Microsoft Certified Systems Engineer in the Lexington, Ky., area, tracks down the answers to your questions. Call (800) 622-1108, Ext. 7476, or send your questions to [helpdesk@networkref.com](mailto:helpdesk@networkref.com).

We upgraded to IntranetWare last summer. We mainly have DOS workstations, but four of the workstations are PCs running Windows 95B. Two of the Windows computers have Client32, which we upgraded several months ago.

On one of the computers, a message appears throughout the day saying the PC is no longer connected to the server, and asks us to wait while it tries to reconnect. All of our DOS applications and data are on the server.

Novell's knowledge base contains Doc No. 2931049, which pertains to a Client32 disconnect message. However, the message doesn't apply to our situation, and I can't find anything that does. Via the Internet

You have several options. First, to rule out the possibility that this is a software problem, go to [www.novell.com/coololutions/zenworks/download.html](http://www.novell.com/coololutions/zenworks/download.html) and download the recently released ZENworks client. With ZENworks, users receive new and updated applications that have been personalized with information stored in Novell Directory Services.

Next, move your network card to a different slot, interrupt or I/O address setting. Doing so will eliminate the possibility of a conflict between your computer and the network card. You also can try a different brand of network card to see if it's more compatible with the devices you're using.

If problems persist, you may be looking at more of a physical plant issue. You may find it worthwhile to run a temporary network cable between the workstations and the wiring closet, or move a workstation to another location to see if the problem follows the machine. If the problem occurs at a certain time during the day, an electrician or other expert should be able to identify an electrical problem.

## Standards smooth software development

By David Linthicum

Until recently, software development too often has been a monolithic project resulting in huge amorphous masses of code that lack structure, use resources inefficiently and lack true interoperability with other programs.

Today, developers are adopting new software development techniques based on component software development — the rapid development, assembly and reuse of small, reliable objects to create sophisticated programs.

For application software users and developers, the benefits of component software development — namely reusability, reliability, interoperability and portability — have largely remained elusive. Two camps have risen to prominence with specifications for how the components should be built: Microsoft's Component Object Model (COM) and the multivendor Common Object Request Broker Architecture (CORBA).

The objective of both standards is to let developers create components with standard, predictable interfaces so the components can be assembled to create applications, no matter where they are located or who designed them.

CORBA is a cross-industry specification for standard components that may be distributed across a network. With CORBA, the component-based application can request an operation to be performed on a component — either around the corner or around the world — and receive the results. The Object Request Broker (ORB) handles the communication among the various components.

The distributed nature of CORBA objects means that applications can share information and synchronize activity across multiple machines for better performance, scalability, fault tolerance and flexibility. The Interface Definition Language maps back to a number of existing programming languages, which means CORBA can support many different program-

ming languages and platforms, even within a single application. Numerous tools support CORBA, although their source codes may not be 100% portable among them.

The CORBA ORB provides four main components: the ORB, object services, common facilities and application objects.

Application objects are pieces of code that support an application directly and ensure that objects can communicate with other CORBA-compliant ORBs.

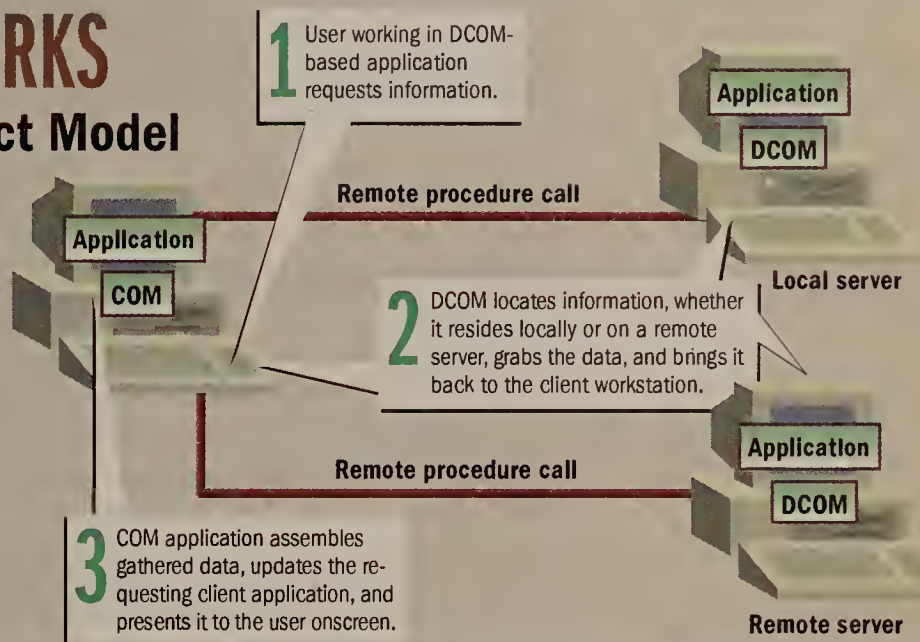
In the other camp, Microsoft has developed and championed COM and DCOM, its model for distributed components. COM defines how components and

port is also available on a variety of non-Microsoft platforms, including Solaris, Digital Unix, MVS, OS/400, AIX, HP-UX, OpenVMS, SINIX, Linux and SCO UnixWare.

DCOM is very different from CORBA because it is built into the operating system and network, and an ORB vendor does

### HOW IT WORKS Common Object Model

Users and developers have long sought to make reusable, reliable, interoperable and portable software. Two competing software component standards are emerging that might make those goals achievable: Microsoft's COM/Distributed COM (DCOM) and the multivendor CORBA. Here's how COM/DCOM works.



Although these components are related to CORBA, you'll find similar features in Microsoft's COM.

An ORB is an engine that can communicate with other local or remote objects using a well-defined common interface and line protocol. ORBs make requests to other ORBs — using the same standards, such as Distributed COM (DCOM) and CORBA — and process responses. CORBA defines how these ORBs work together.

Object services are groups of services that use an object interface to communicate from one application to the next. Object services include security, transaction management and data exchange. Using this base set of offerings, developers can build other functions on top of them. Object services are mandated by CORBA.

Common facilities are also collections of services, but they relate more to a client than to a server. Common facilities are optional CORBA services.

their clients interact. In a local setting, the client and the component can interact without any intermediary system component, or overhead.

In its early iterations, COM had no notion of distributed components. With DCOM, Microsoft has extended COM to support communication among objects on different computers on a LAN, WAN or even the Internet. DCOM lets COM-enabled (OLE-enabled) application development tools and even office automation applications access COM automation servers that physically exist on the local machine or on a machine connected by a network. The application checks with the Windows NT registry to locate the remote ORB, and then it invokes its services.

Other COM-enabled applications existing on the network can access that object by locating and invoking its methods through the DCOM mechanism built into the Windows NT and 98 operating systems. COM/DCOM sup-

not deliver it. For current Windows 98 and NT shops, this means DCOM is already there. What's more, although CORBA has yet to attract the mainstream tool market, COM is already a part of most development tools you purchase for Windows.

By contrast, CORBA applications will require that a CORBA ORB be installed on every PC using that application. When you consider the scope and complexity of enterprise-scale deployments, there are significant administration and maintenance problems during deployment and, often overlooked, during upgrades. CORBA vendors have recognized this limitation and are currently working diligently to get their ORB bundled in some fashion as a standard software configuration.

Linthicum is president and chief technology officer for Software AG Americas, a leading provider of enterprise middleware and services in Reston, Va. He can be reached at (703) 860-5050.



## A convergence resurgence and a new honor for *Network World*

**C**onvergence, that battered buzzword of the younger '90s, has come back with a vengeance. Venture capitalists and their start-up progeny, consultants and other pundits are once again waxing eloquent about the convergence of voice, data and video — this time over IP networks.

Is today's convergence any more solid than the chimera of yesterday? The answer seems to be yes, as you'll find in our special 17-page IP convergence section beginning on page 35.

We explore every aspect of IP convergence and the dramatic changes it will impose on the data communications and telecom industries — as well as on your enterprise networks. What's more, we offer you a look at the potential winners and losers, as well as a variety of convergence perspectives from columnists such as Tom Nolle, Christine Heckart and Howard Anderson.

While IP convergence is coming, there are a great many issues to be resolved. For one thing, it's not clear who's going to foot the bill for the network changes required, nor can we say with certainty what enterprise customers will wind up paying for the next generation of telecom services. As Robert Lucky, the renowned Bellcore researcher, notes, "There isn't anyone who understands the economics of this. We're going to find out according to which companies go bankrupt."

On a separate note, *Network World* last week was honored by *Folio*: magazine, the leading magazine of the publishing industry, in its ninth annual Editorial Excellence awards. The awards recognize publications for living up to their editorial mission statements: In our case, that means providing the news and insight that helps you to be more successful in your job.

In choosing us as the winner in the Telecommunications category, the *Folio*: judges wrote: "Not only does the magazine have a sense of humor, it keeps the pace with fantastic graphics and stories that engage even the non-network manager."

Gee, thanks. The *Folio*: prize is the latest in a string of awards garnered by *Network World* this year. In March, we were honored by the American Business Press for "best single issue of a newspaper," and in June, we were cited as one of three finalists in the "best news-weekly" category in the Computer Press Association's annual awards. Our aim is to produce a publication that, in addition to solving current problems, stimulates your thinking about the future. With all due humility, I think we've done that with our IP convergence package. Take some time to explore the changes ahead, and then share your thoughts with us.

John Gallant, editor in chief

jgallant@nww.com

*Venture Over the Horizon • Kevin Fong*

## Y2K presents opportunities as well as problems

**S**en. Robert Bennett (R-Utah), chairman of the Senate's Special Committee on the Year 2000 Technology Problem, recently shared his advice on what the average citizen can do to prepare for the millennium: Stock up on food (the supermarket might not have any to sell you) and warm clothing (electricity may be problematic), and above all, don't plan to spend New Year's Eve 1999 in an elevator, hospital or airplane.

Bennett is not alone in predicting doom and disaster when the clock strikes 12:01 a.m. on Jan. 1, 2000. Depending on what you read, the dawning of the year 2000 will trigger a worldwide recession or a mass panic, or will bring the governments of the world to their knees.

The Year 2000 problem has also had a dampening effect on the network companies in which my organization has invested. New IT projects are being put on hold until the Year 2000 problems are remedied. Of course, no one would invest in a company whose only reason for existing was to solve Year 2000 problems. What would such a company do once the millennium has dawned?

There is one bright spot to the Year 2000 problem, however. Along with bringing their networks into the 21st century, IT managers could use the pause the Year 2000 furor has created to think long and hard about their networks.

It helps to think of the Year 2000 problem as a virus or as a particularly vicious hacker attack. Because the year 2000 is still a year and a half away, you have some time to review your overall ability to react to an attack on your network. What are the issues that need to be dealt with in any attack? How good is your network's integrity and security? What are your emergency procedures? What is the worst-case scenario if you fail to fend off the attack? What will be your company's reaction if the network is compromised or fails?

Specifically, you should look at your firewalls. Firewalls are just as time-dependent as the rest of your network. Most firewalls have time-of-day restrictions that will be compromised by the year 2000. In dealing with Year 2000 issues, however, you also should test your firewalls for security breaches of all types.

Prioritizing software applications to determine which applications

deserve a full-fledged Year 2000 work-up and which can get by with a Band-Aid has benefits that go beyond the year 2000. In the process, you can really get a grip on your exact software-licensing costs and determine an accurate account of which employees are using which applications.

CentaMeter, from Hanover, N.H.-based asset management vendor Tally Systems, is being used in just this way. CentaMeter compiles software usage data by user and application. You can use this information to identify which applications are run most frequently and by which departments. In addition, the data provided by CentaMeter combined with information from a firewall log can help you investigate any policy breaches. (Mayfield Fund is not invested in Tally Systems.)

Another way to think of the year 2000 is as a potentially large customer service problem. Let's assume you get most of your Year 2000 project accomplished by the deadline. You still need to set up a communications plan to let customers know there may be problems in meeting their requests in the most timely fashion. Your customer service organization needs to have a plan to help customers when they call about year 2000-related problems.

The growing complexity of mission-critical networks means it is inevitable that they will fail even when the year 2000 is well behind us. The exercises an IT department goes through testing its networks for Year 2000 compliance will have applications in other emergencies.

Fong is a general partner of Mayfield Fund, a venture capital firm based in Menlo Park, Calif. He can be reached at kfong@mayfield.com.



MESSAGE

Send letters to [nwnews@nww.com](mailto:nwnews@nww.com) or John Gallant, editor in chief, *Network World*, 161 Worcester Road, Framingham, MA 01701. Please include phone number and address for verification.

### Striking a balance

Your article "Feds want a digital certificate in every pot" (July 13, page 8) found a nice way to report on the glacial progress in this Internet security area while still encouraging the government to continue to move forward in a positive direction and politely chiding industry leaders for being too slow to make security commitments. Well done! Please continue to focus on this issue; it is critical for implementing business-to-business Internet commerce.

Your publication helped initiate the public discussions on electronic/Internet commerce

# The new face of network competition

**N**etworking used to be a really interesting game. Hundreds of new companies whose names were filled with the letters X and Z offered all kinds of exciting technology. Level 2 switching gave way to Level 3, then 4, and soon we'll be up to Level 8.

Or maybe we'll be in the twilight zone, networking-wise, because there are strong indications that our old comfortable world is changing. All those X and Z companies are being replaced by three firms with the initials C, L and N. Why do Cisco, Lucent and Nortel seem to be preparing to divide the world among themselves, and what will happen to the rest of us — vendors and buyers alike?

Behind all this vendor dancing is a basic change in the market. It's pricing. LAN switching is falling to less than \$100 per port. At that price, switching products can't be sold through a direct sales force and switch profit margins are tiny. The vendors that rely most on LAN sales are hit the hardest, so Cisco — whose router profits are enormous — is weathering the trend while 3Com and Cabletron stumble a bit.

There is probably more stumbling ahead as prices continue to fall. LAN switching at 10M bit/sec is headed toward \$50 per port, and that's going to mean new players. Who'd want to enter that kind of market? The firms that already sell in retail outlets. The kingpins of tomorrow's LAN market will be Intel, Compaq, Dell and Hewlett-Packard — the system and chip vendors. The profits these firms earn in their core markets and their consumer visibility growing out of those core markets will make them the big players in the LAN.

In the WAN, the number of network-dependent businesses is growing faster than end-user technology staff. Twenty years ago, almost all WAN buyer organizations had a high level of technical skills on staff. Today, fewer than one in three does. The result is a trend toward outsourcing enterprise networking to the carriers. That's why Lucent and Nortel are suddenly being cast as key players in a data market.

In a survey my firm conducted five years ago, a user responded to a question about Nortel by asking, "Is that that new start-up in Minnesota?" Today, that "new start-up" has bought Bay Networks, which was once seen as Cisco's archcompetitor. Why? Because the WAN's future belongs to the carrier virtual private network (VPN) service, not the private enterprise network, and Nortel has a strong position with carriers.

The sale of Bay, the biggest of the second-tier players, is a sure sign that the changes in the market are going to have an impact on the rest of the second-tier firms. 3Com, Cabletron, Newbridge and even Ascend are probably going to have to band together as a group or be bought. Besides the Big Three, the buyer candidates are a who's who of the carrier world, notably Siemens, Alcatel and Ericsson.



Imagine a Siemens executive in a business suit arm-wrestling with a Cabletron guy, a la former Cabletron CEO Robert Levine — the mind boggles.

The buy-or-be-bought frenzy is affecting new market entrants as well. Three out of every 10 start-up firms are nonviable right out of the box. They're being puffed up by clever merchandizing to be sold to somebody, not to sell products. Even viable new market entrants may have to be acquired to sell their products, because carriers are conservative in committing their traffic to untried vendors.

Is this going to change networking? You bet. We're headed toward a marketplace in which giants stomp about and niche players scurry between their feet. Once in a while, a niche player will eat some high-protein market segment and get large enough to challenge the bigger players, but only once in a while. Hardware technology issues are going to become increasingly secondary to price issues.

But the really interesting stuff will happen when cheap switching dominates the LAN and VPNs provide businesses access to carrier services with no capital cost and no complicated projects. For example, we'll be able to set up a VPN for a two-hour collaborative conference. The focus will shift to software for applications in the network. That's already happened in the PC market. Read an issue of a PC publication and see how many software articles and ads there are, compared with PC articles and ads.

Networks serve businesses and users, but neither consumes the hardware. Applications that run on nets are what consumers and managers are buying. The focus on building an infrastructure to run those applications is logical when that structure isn't in place or isn't adequate. We're fixing the hardware problems of networking, and we're getting ready to go to the next level.

That brings us back to the Compaqs, Dells, Intels and HPs of the world. As prices fall and the base of users broadens, networking of computers increasingly will be the domain of consumer-level vendors. We've been tolerant, if a little condescending, about the offerings of these and other system players, and some (such as Digital) haven't made a big success of their networking attempts. Nevertheless, these guys have the right formula: They touch the user directly with their products, their names are recognized, they have retail channels to move products through and they sell enough network/system elements to earn a good profit from the whole package.

Maybe 10 years from now we'll be arguing over whether Compaq will buy Lucent, not the other way around.

*Nolle is president of CIMI, a technology assessment firm in Voorhees, N.J. He can be reached at (609) 753-0004 or tnolle@cimicorp.com.*

in the early 1990s, and *Network World* is still the place to go to find the latest and most comprehensive information on public and private sector issues.

*Robert Frank*  
President

*Open Commerce*  
San Ramon, Calif.

## Just say no to NT

Thank you for your article "Don't mess with their NetWare" (July 20, page 24). I have been saying these same things to my managers for the past year, and their reaction has been, "Well, we never hear anything like that in the press. NT is taking over the world; Novell better get out of the way." I've told them that I'll accept NT on the desktop, but not for my primary servers. I'll take it on secondary servers only when there is an application that we must have for our line of business.

Keep up the good work, and please publish some NT horror stories to keep some balance in

the news.

*Fred Wagner*  
Information services manager  
Richards Watson & Gershon  
Los Angeles

## A different animal

In her letter to the editor, Cindy Cook claims that, unlike NT servers, NetWare servers can run continuously without rebooting (July 20, page 37). I have seven NT servers that never go down.

The problem is, IT professionals are trying to build an NT network the same way they build a NetWare network. They should try to look at NT as a different animal. Microsoft has the only homogeneous network solution for database, application, terminal, file and print services. NetWare is great for file and printer services. Novell

Directory Services is the only choice for large distributed networks.

When Novell released NetWare 4.X it abandoned me and my fellow 3.X Certified Novell Engineers by not offering us an inexpensive certification upgrade.

So when NT came along, I felt it was necessary to abandon Novell.

*Gary King*  
Manager of information systems  
Flintlock  
Houston

## Defending Sam

I disagree with Mark Gibbs' perspective in his column "Laugh, but watch out for Uncle Sam" (July 20, page 62). I think the antimonopoly laws are a very good thing for the country and the economy. If

Microsoft and Intel haven't broken the law, they have nothing to fear. If they have, then they should be stopped.

How about going to Compaq and threatening to keep it from using Windows 95 if it ships a single computer with a browser

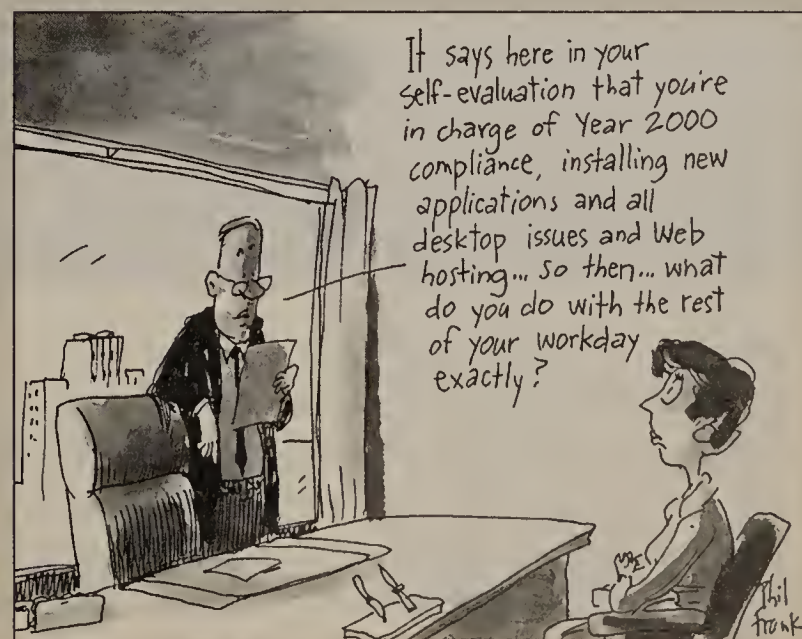
that is not Explorer?

This is the kind of abuse that needs to be investigated and punished if proven true.

Only the government can do that.

*Caio Villela*  
Santa Cruz, Calif.

## Teletoons



Phil Frank and Joe Troise babe@sfgate.com

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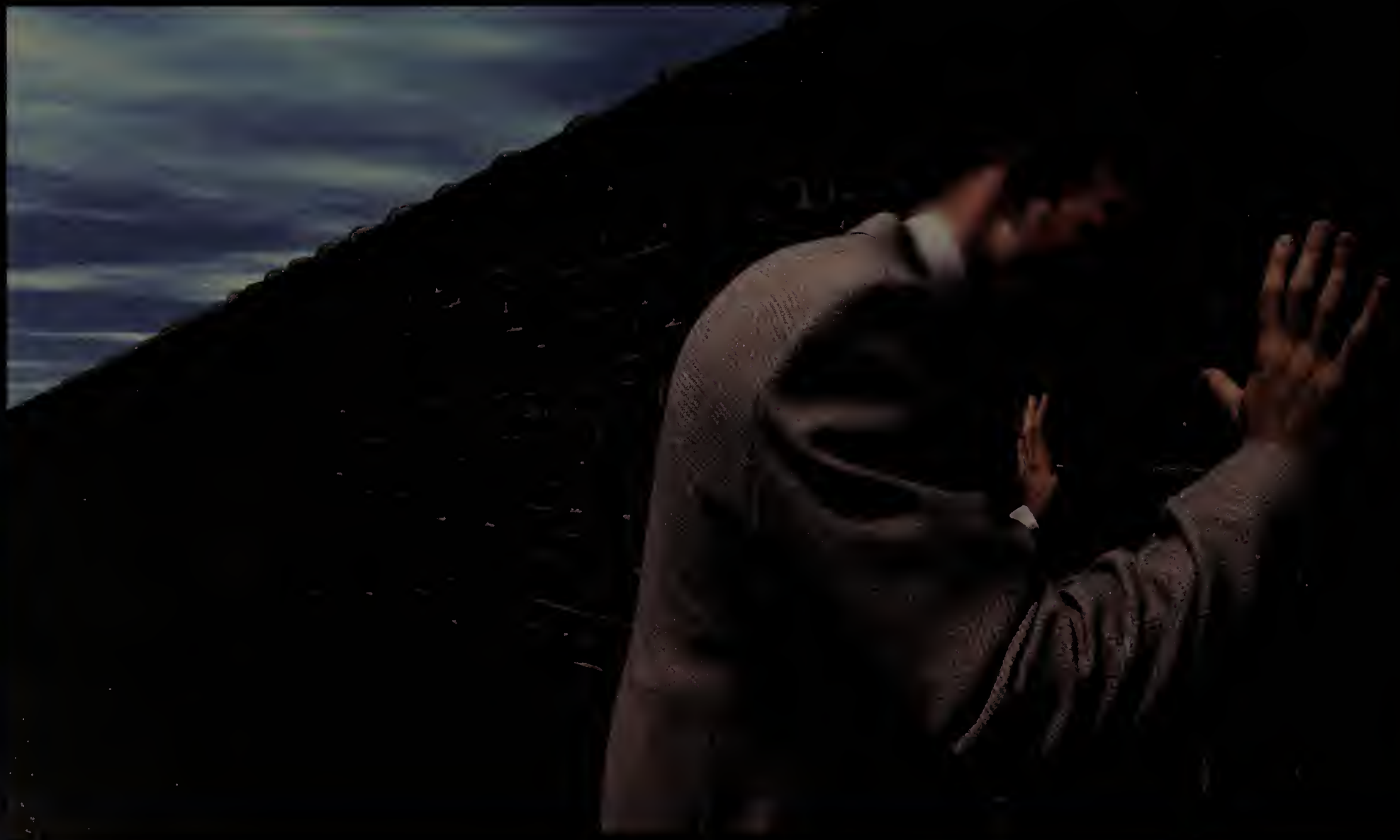
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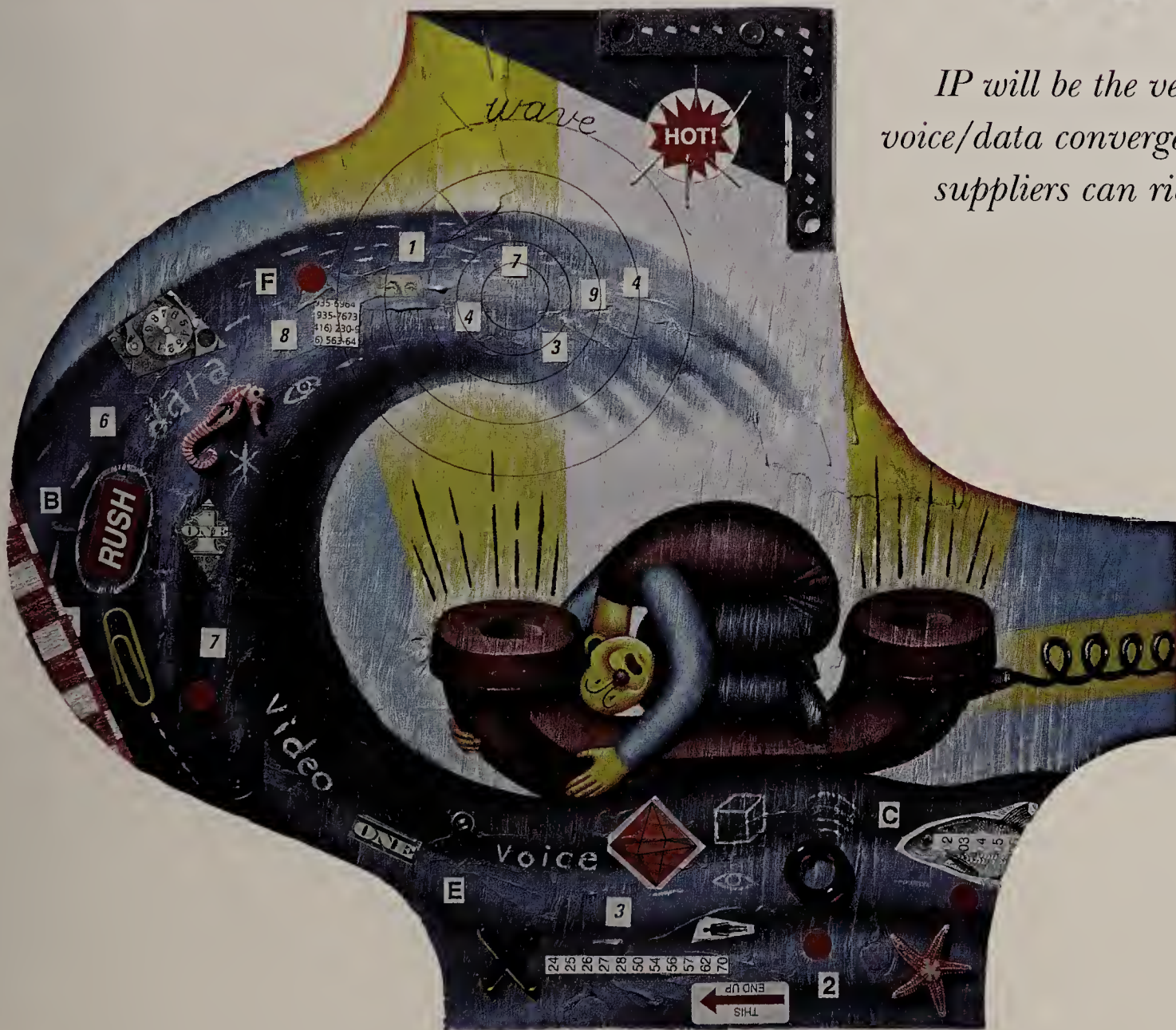
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# IP Convergence

## BUILDING THE FUTURE

# There's no stopping IP

*IP will be the vehicle that finally delivers voice/data convergence, but only if carriers and suppliers can ride out some tough issues.*



By Susan Breidenbach

**T**here is no escape. Convergence is coming, riding the IP wave high and hard.

Like the unseen yet powerful undertow that follows a wave, ever-expanding data networks are exerting a gravitational pull on voice, making the long-awaited convergence of telecommunications and computing a reality. With IP data packets increasingly dominating telephone networks, a circuit-switched infrastructure optimized for voice just doesn't make sense.

The only real difference of opinion revolves around how fast the IP wave is coming and how it will clear some significant obstacles. There are standards issues to be resolved, some of the enabling technology is missing or too expensive, and phone companies have billions of undepreciated dollars sunk in traditional analog voice equipment.

Optimists claim we could start seeing significant con-

vergence as soon as six years from now, while other prognosticators say it will be closer to 20.

But nobody disputes that the convergence wave will eventually consume all in its path.

### Critical mass

The benefits of a combined voice/data infrastructure — simplified management, a single support staff, elimination of dual networks, productivity-enhancing applications — have been cited by network strategists for decades. ISDN was introduced 15 years ago with convergence in mind, and the industry tried again with ATM earlier this decade. In between we witnessed the failure of IBM's merger with Rolm.

See No stopping, page 36

## Inside:

**IP ECONOMICS:** How convergence translates to cost savings and where to look for the biggest bargains. PAGE 37.

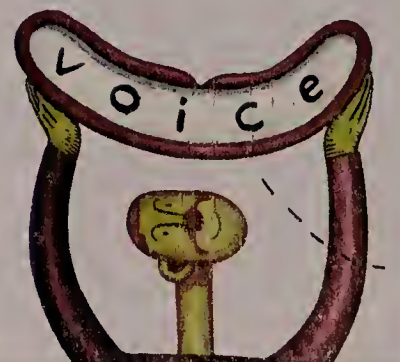
**REGULATORY ISSUES:** They may reach out and bite IP. PAGE 52.

**USERS SPEAK:** Pioneers are dabbling with IP convergence and showing the promise it holds, but wholesale migrations aren't yet in the cards. PAGE 56.

**THE TECHNOLOGY:** There's no shortage of standards. PAGE 60.

**GETTING THERE FROM HERE:** Tips for planning your voice-over-IP migration. PAGE 61.

**CARRIERS TAKE CONVERGENCE PLUNGE:** It's sink or swim for long-distance carriers, local providers and fiber-rich upstarts. PAGE 62.



ILLUSTRATIONS BY RICCARDO STAMPATORI



IP OPINIONS By Howard Anderson

# From the IP convergence FAQ file

*Is there a fundamental change underway toward a single IP-based packet infrastructure that can handle voice, data and video?*

Bet on it. It not only will happen faster than anyone thought, but for most users, they won't even notice it. Today, most enterprises have at least six networks, most of which connect to each other mainly by rumor.

*Six? Please give some examples.*

Every enterprise has a big old-fashioned circuit-switched voice network that historically accounted for 80% of the firm's traffic but now is closer to 50%. This circuit-switched voice network is still growing — but slowly.



Traditional telephony is growing about 3% per employee per year in total minutes. The real growth of the network has come in new applications, such as voice mail and call centers. Most companies' call center traffic is increasing by 20%.

This first network is addressable by IP switching. Perhaps only 5% of this traffic will migrate to IP switching in the next two years. But in big companies, such as those in the Yankee Group 200, IP might assume 30% of this traditional voice traffic in five years. Call centers will become cyber call centers, and voice mail could easily migrate to IP.

*What is the second type of network an enterprise has?*

Each Yankee Group 200 customer has an IBM SNA network to carry mission-critical applications. While not actually growing, this network is large. Administrators would have no problem migrating at least half of these SNA networks to IP within the next three or four years. Another 25% of the legacy networks could make the switch in the following three or four years, while some of them may never move.

*That's two.*

The third type of corporate network is client/server, an architecture that's ready to go to IP today. Client/server was designed for nonhierar-

chical communications. Client/server deployments such as Windows NT are growing 35% per year. Many of The Yankee Group's larger customers are retrofitting their SNA networks to this environment, and almost all new development is on the NT platform.

*What about intranets and the Internet?*

The Internet and intranets only generate a small portion of overall network traffic but are more than doubling every year. That's 10% per month, 120% per year. The real truth is they are growing so fast that only half of the larger companies we are talking to can guess about their own growth. This fourth category of networks has the advantage of being packet-based and IP-ready.

*What are the last two?*

Those are easy — international voice and international data, including faxes. Since carrier services are expensive, companies have good incentive to migrate this traffic to IP. The infrastructure is already in place, and the international voice and data networks of large firms are growing at 18% per year. A fax to Israel may cost \$4 today but will drop to just 20 cents over IP. At that rate, it's amazing more companies aren't migrating this traffic to IP.

*What's the bottom line?*

Companies will first peel off expensive applications and put them on IP, then they'll move right up the food chain. Video? Yes, but that's not the killer application. Every company has 110 different vendors in its network and far too many technologies. Every smart firm wants not just fewer vendors, but fewer technologies. Their network control centers are overwhelmed.

IP switching is the architecture they're building around and they'll search out carriers and suppliers who see the world the same way.

*Anderson is founder and president of The Yankee Group, a Boston-based consultancy. He can be reached at [handerson@yankeegroup.com](mailto:handerson@yankeegroup.com).*

## No stopping, continued from page 35

How is it that IP — a thirtysomething technology designed with something entirely different in mind — is going to be the workhorse that finally pulls off convergence?

"What drives this industry is critical mass," says Herb Osher, vice president of marketing for Bell Atlantic Network Integration in Frazier, Pa. IP and the Internet reached a critical mass that sucked in investment dollars and application developers.

"IP may not be the best technology, but it's ubiquitous, it's the corporate intercommunication standard and it's good enough," Osher says.

There are countless companies working on new features for IP equipment and related software. They range from traditional data communications giants — such as Cisco, 3Com, Bay Networks and Newbridge Networks — to IP telephony specialists such as VocalNet Communications and an ever-expanding host of newcomers. By contrast, there are really only two North American manufacturers — Lucent Technologies and Nortel — developing circuit switches for carriers; and both of them also make IP equipment.

Packet-switching equipment doubles in performance every 10 months or so, while it takes circuit switches at least four times as long to achieve the same improvement. With Internet traffic doubling every six months, only packet switches have a prayer of keeping up.

"Building up the telephone network to satisfy this kind of demand growth is out of the ques-

tion," says Peter Sevcik, an associate of Northeast Consulting Resources in Boston. "That's why circuit switching is doomed."

## New bandwidth economics

Bill Hawe, vice president and chief architect at Bay, says the new "attack carriers" are building networks under new rules. An emerging generation of routing switches handles massive amounts of IP packets at a performance and cost dramati-

cally different from that of the past. In just the past year, prices for data network equipment have dropped by a factor of 10, while performance has risen by about the same amount.

"We've been calling this the new economics of bandwidth," Hawe says.

Investments in circuit-switching infrastructure aside, convergence is also a potential cost saver for traditional carriers. Circuit-switched networks divide bandwidth into rigid 64K bit/sec pipes and assume only a certain percentage of subscribers will be accessing the network at once. Packetized voice allows many conversations to take place over the same pipe simultaneously. And what takes 64K bit/sec on a traditional voice network can fit into 8K to 12K bit/sec without any loss of quality.

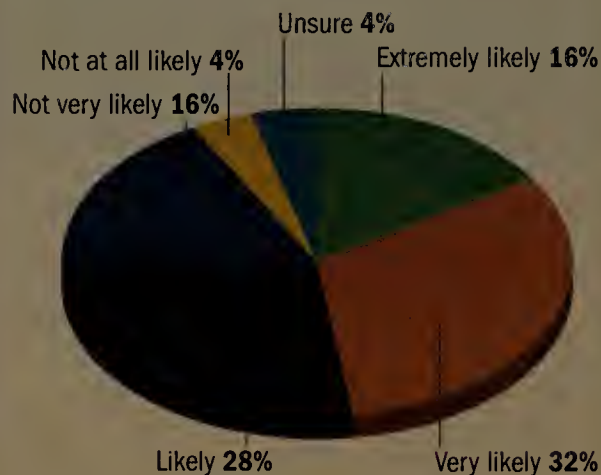
"Pure network economics says you want to travel on the largest network," says Tom Evslin, chairman and CEO of ITXC Corp., a start-up in North Brunswick, N.J., that provides IP telephony services to carriers. "When we packetize voice, we are using computing power at or near end points to avoid using network bandwidth. And following Moore's Law, we get twice as much for the same price every 18 months." (See story, opposite page.)

Packet nets are also more flexible than circuit-switched networks. A smart PBX on an IP network can watch traffic levels and implement compression mechanisms in real time when the network gets overloaded. The line quality drops a bit,

*See No stopping, page 38*

## THE PEOPLE WANT IP VOICE

Network World asked 500 readers to assess whether they would consider using voice over IP.



SOURCE: NETWORK WORLD 500/PROGRESSIVE STRATEGIES



# IP economics

*How convergence translates into cost savings and where to look for the biggest bargains.*



Will a converged network cost you less than the separate infrastructures it replaces, and give you more bang for the buck? The answer to both questions is yes — usually.

In theory, packetized voice is more efficient than traditional analog technology and will increase its advantage over time. Computing power at the edges is being used to save bandwidth on the backbone, and Moore's Law says the same money will buy twice as much processing power in those edge devices every 18 months. It will cost carriers less to transmit packets, and some of those savings should get passed on to customers.

Some experts say packetized voice can save subscribers substantial amounts on long-distance charges, based on today's prices. How much can be saved — if any — depends on the number of switches and length and type of WAN links.

Joseph Rinde, director of switched network architecture for MCI, says regional public switched telephone network (PSTN) and IP telephony costs are about the same. However, IP telephony can handle coast-to-coast calls for 64% less because the efficiencies of packet networks compound as distance increases (see graphic).

But the economics of international calling are a bit different. Because overseas bandwidth is relatively scarce, switches used for international PSTN calls have evolved into much more sophisticated creatures than their domestic counterparts. They support bandwidth on demand and are able to

handle voice, fax and data more efficiently. Consequently, Rinde concludes it costs no more, on average, for carriers to run voice over the PSTN internationally than it does for them to run voice over IP; he even gives the PSTN a slight edge.

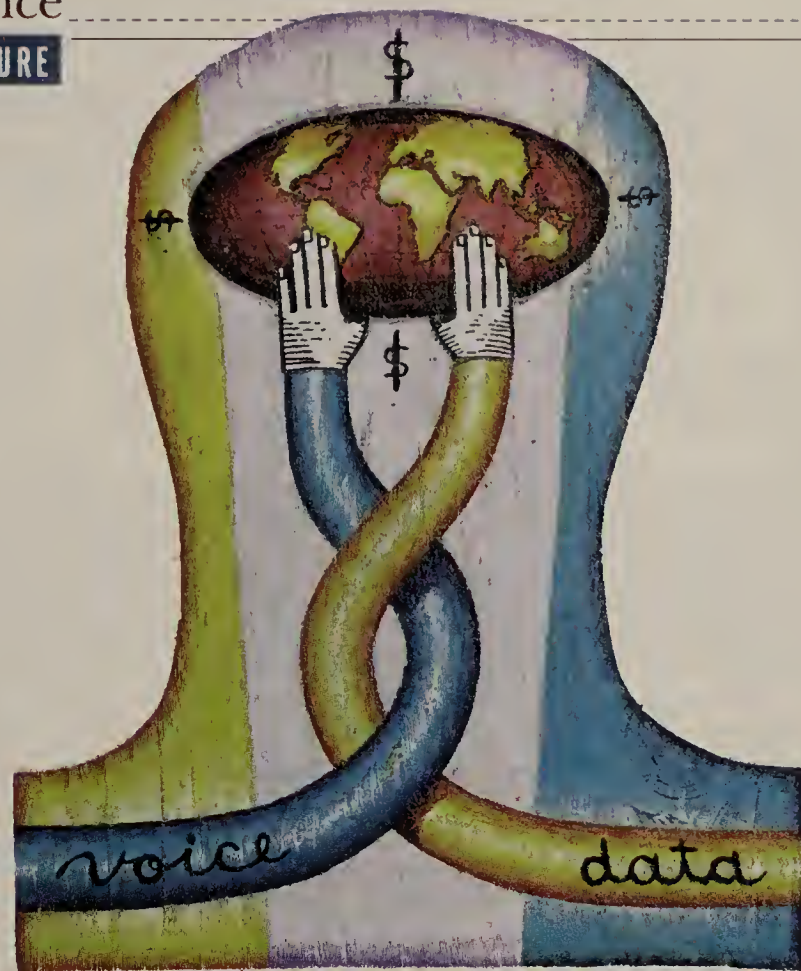
While converged services from carriers are not yet widely available, companies with private intranets spanning the country are in a position to benefit by adding IP telephony internally. "This is where cost savings can be realized right now because these self-contained private networks can be controlled and managed," says Mark Fisher, vice president of corporate marketing for Concentric Networks, an IP services provider in Cupertino, Calif.

Nortel last year did just that, and reduced its phone bill by 40% in the process, says John Roth, the company's president and CEO. Intranet company voice and fax calls now go across an internal IP data network, riding on previously unused bandwidth.

The use of corporate intranets is an interesting parallel to the evolution of T-1 networks in the

1970s and 1980s, when corporations started setting up their own internal telephony services to save on long-distance charges. Then companies began taking advantage of the silences within and between voice conversations to send data bits for free on these private leased lines.

"Now data is getting so large relative to voice



that we will soon reach the point where voice can be absorbed on the data networks, just as the original data traffic was absorbed by voice networks," says Roshan Sharma, principal of Telecom Network Science, a consultancy in Dallas. A pioneering designer of the first T-1 voice/data networks, Sharma says companies can now get voice costs down to zero to 2 cents per minute by implementing IP telephony.

It's hard to know what converged networks could save on voice costs in any given instance because IP telephony billing has yet to sort itself out. Circuit switching is a connection-oriented Layer 2 technology that lends itself to keeping track of individual calls and billing for them. Devising billing systems for a connectionless environment such as IP is a much bigger problem.

"ISPs came up with the 'all you can eat for a flat rate' approach because they had no way to keep track of call-by-call usage," says Ed Kennedy, vice president of marketing for Alcatel's data networking division in Ashburn, Va. "You have to know the origination address, destination address, authorization, type of service the caller has and so on."

On the PSTN, switches track all these factors by communicating with one another through a separate Signaling System 7 network. There is no equivalent in the IP world. Also, big PSTN Class 5 voice switches maintain databases with complete sets of information, while everything is distributed in IP networks. Call information has to be collected and assembled because it isn't all stored in one place.

"IP telephony billing is still very immature," Kennedy says. "The problem is huge."

Sprint is trying something new with its recently announced Integrated On-Demand Network service. You pay a flat rate for a fat pipe, but a virtual "bit meter" keeps track of usage and adjusts your bill accordingly. The approach may be cheaper, depending on pricing, which Sprint hasn't yet announced. At any rate, this model will make phone costs more predictable and enable users to provision bandwidth for themselves.

But the main savings from IP telephony will stem from increased productivity, which is harder to

*See Economics, page 38*

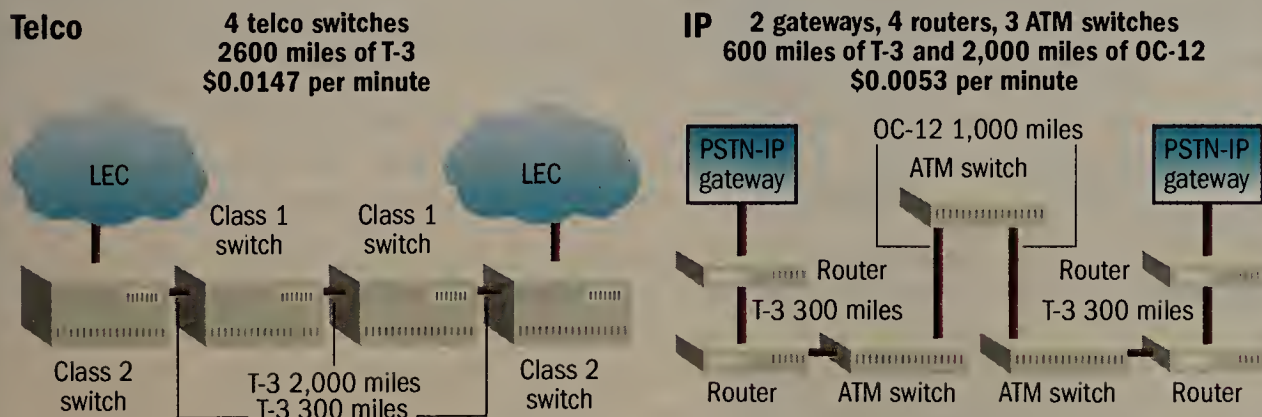
*"IP telephony billing is still very immature. The problem is huge."*

Ed Kennedy

Alcatel

## CARRIER COSTS FOR COAST-TO-COAST CALLS — IP BEATS THE PUBLIC NET

As the diagram shows, carriers reap the greatest savings with IP over long distances where high-speed lines are employed. In this scenario, the IP savings amounts to nearly a penny per minute (.94 cents), or about 64% as compared to using the PSTN. For regional calls, where mainly just T-3 lines are employed, there is no real savings with IP.



Note: Each scenario assumes the carrier owns the routing and switching equipment and leases the transmission lines.

SOURCE: JOSEPH RINDE, MCI

*Economics, continued from page 37*

quantify than transmission costs. While business is moving rapidly toward extranets and electronic commerce, many companies can't participate because they lack the in-house expertise to implement and manage the necessary infrastructure.

As convergence pushes intelligence to the network edge, carriers can help address that problem. Smaller companies and those with remote offices can outsource many functions to avoid expenses. Outsourced functions might include Web sites, electronic commerce servers and e-mail systems.

Another outsourcing candidate is fax, which is

often cited as a natural IP telephony application.

"Half the cost of a fax server is tied up in gear for talking to the analog phone network," says Bill Fallon, vice president of marketing for FaxSav, a provider of IP fax services in Edison, N.J. "If faxes can just stay on IP as they move on to the public network, companies don't have to invest in all that equipment."

Companies can also save a lot on line charges, at least today. Fax traffic accounts for about one-fifth of all domestic long-distance calls and more than half of all PSTN international calls that originate in the U.S. Substantial savings can be realized by mov-

ing this traffic across the public Internet backbone instead, and little or no infrastructure investment is required. You can install IP gateways to do it yourself, or sign on with an Internet fax service.

"It's not just about saving on transmission costs," says Paul Severino, chairman and CEO of Net-Centric, a start-up in Bedford, Mass., that sells Internet fax technology to service providers. Optional in-box software can turn incoming faxes into e-mail, he says, which can be distributed or stored like any other electronic document. It moves us one step closer to universal messaging.

— Susan Breidenbach

*No stopping, continued from page 36*

but everyone still gets a connection.

"Compressing voice in real time wasn't feasible even five years ago, but it is now," Evslin says.

Convergence can also reduce operational costs for service providers. Without it, ISPs might buy a variety of switches and routers that each have different traffic-management mechanisms. IP provides a lingua franca that enables unified traffic management from a single platform.

In general, carriers can offer multiple services more efficiently by moving them onto a single, improved infrastructure. As bandwidth becomes a low-margin commodity, service bundles and value-added features will become imperative for survival.

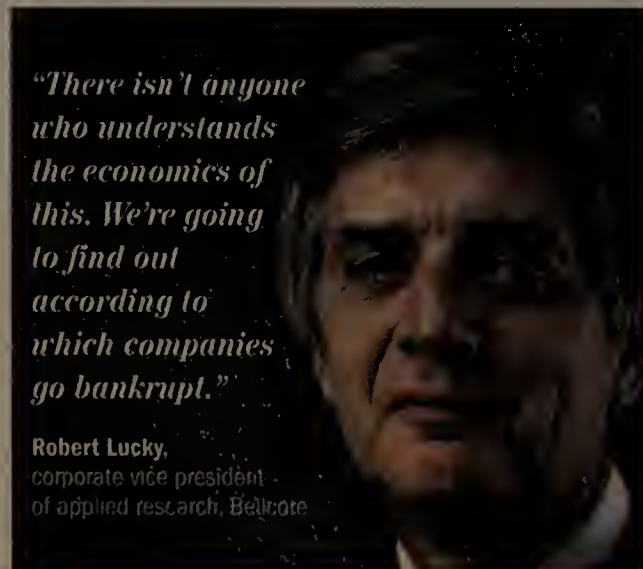
"Convenience will win," says Hong Chen, president and CEO of Milpitas, Calif.-based GRIC Communications, which provides network management, billing and other services to ISPs and telcos around the world. "Every bill costs the phone companies \$1 to \$2 to send and takes a similar hit on the receiving side. And users also have to bear the cost of maintaining relationships with multiple suppliers. There is a huge savings to be realized on both sides by converging networks and services."

**Change of heart**

That's a significant change in thinking from just a few years ago when IP telephony was first introduced. The voice quality of the initial products was poor. As recently as 18 months ago, many traditional carriers comforted themselves with the belief that IP telephony could not deliver business-quality voice.

There have been big improvements since then, and on international calls some of the products can give you about the same quality as circuit-switched networks.

"When the carriers heard the voice quality we

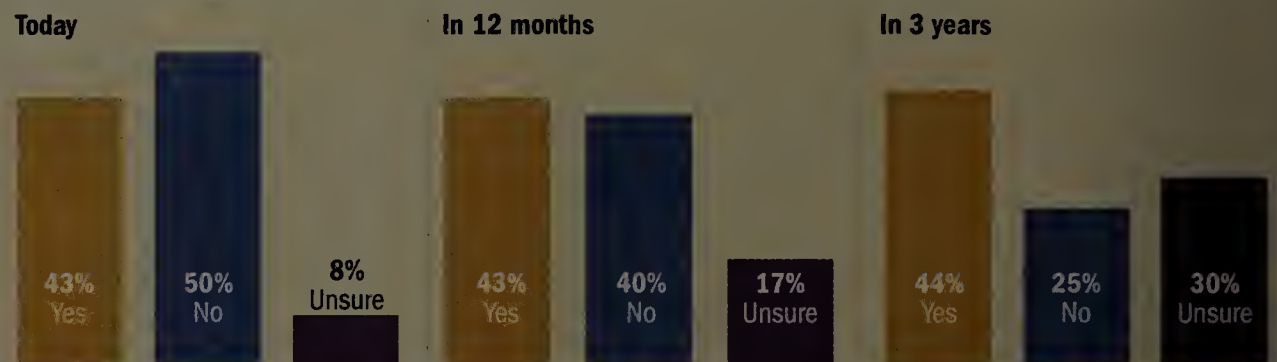


*"There isn't anyone who understands the economics of this. We're going to find out according to which companies go bankrupt."*

Robert Lucky,  
corporate vice president  
of applied research, Bellcore

**MINDS ARE MADE UP**

We asked 500 readers whether they get Internet connectivity from the same carrier that provides their data and voice services, and whether they expected to in the future. A healthy number already do, but the others aren't sure they will, even three years from now.



SOURCE: NETWORK WORLD 500/PROGRESSIVE STRATEGIES

Note: Due to rounding, not all figures add to 100%.

could deliver with our latest generation of products, they went through a period of seeing IP telephony as a threat," says Heidi Bersin, vice president of marketing for Clarent, an IP telephony gateway vendor in Redwood City, Calif. "But now they see it as an opportunity to get into new markets very quickly as the world deregulates. That's going to happen anyway, so they have to offer these services or lose their customers."

The traditional telcos realize the big growth is in data, not voice, and they are pursuing data services aggressively. The telcos have to install big IP infrastructures to handle the data traffic, and then it is a natural progression to start offering some voice services over them.

Upstart carriers might initially install a network that provides IP telephony to consumers via debit or credit cards. As carriers build out this network, they can leverage it by offering virtual private network (VPN) services to enterprises.

"Once these carriers have both consumer and enterprise networks, they can let their enterprise customers make calls outside the VPNs to customers on the consumer network," Bersin says.

In contrast, ISPs have been slow to offer telephony services.

"That's been the biggest surprise to me," Evslin says. "We're a wholesaler of Internet telephony, and our initial assumption was that the first customers would be ISPs looking to extend their traditional business to include voice. But it's been the traditional resellers selling prepaid calling cards that have moved quickly." Resellers have no qualms about IP because they don't have

to invest in the infrastructure to support it, and they don't have billions of dollars in circuit-switched revenue to protect.

Others are surprised to learn that IP telephony isn't really about free phone calls. To get free phone calls, both parties have to be using a PC as a phone, which isn't very convenient. More commonly, IP telephony connects two people who are using traditional phones. The IP telephony call

may be cheaper than a public switched telephone network (PSTN) call, but it's never free. Someone still has to pay for the IP gateways on both ends and for call termination by a local-access carrier.

Similarly, domestic IP telephony is not about arbitrage of high-priced PSTN services and low-priced IP alternatives. Traditional voice service for corporate customers is down to 3 cents per minute, and time-of-day restrictions have disappeared. Carriers have even begun to offer flat rates to major subscribers.

However, some of these issues don't play the same internationally. For one thing, most of the rest of the world does not have free local calls.

Also, international settlements — regulated fees that phone companies collect for terminating calls originating in another country — can be as high as \$1 per minute. International settlements amount to toll booths that IP telephony can bypass. This government-induced distortion could disappear or change overnight, but meanwhile it is providing a first-stage thrust to convergence (see story, page 52).

See No stopping, page 42

*"IP may not be the best technology, but it's ubiquitous, it's the corporate intercommunication standard and it's good enough."*

Herb Osher

Bell Atlantic Network Integration

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No stopping, continued from page 38

### Bridging the apps gap

In the corporate environment, convergence is at least as much about new applications as it is about cheaper voice calls. Convergence enables developers to build integrated voice/data applications that were impossible to implement economically over discrete voice and data networks.

"Normally, we don't communicate only by using our voices — we use other senses as well," says Elon Ganor, chairman and CEO of Tel Aviv-based VocalTec Communications, an IP telephony gateway vendor with U.S. headquarters in Northvale, N.J. "IP telephony brings us closer to that and helps bridge the distance between people."

IP telephony also gets around the problem of islands created by PSTN voice mail systems. IP voice mail would let you forward messages outside your own system. However, conversing through point-and-click applications is not necessarily cheaper than making PSTN calls.

"IP telephony is about productivity, not saving a few pennies on long-distance calls," says Dave Schriftgieffer, director of data networking at Lucent in Warren, N.J. Once workstations are enabled with H.323, an emerging standard for multimedia communication across packet-based networks, people can just click on a button to talk and enable a data or video session (see story, page 60). Remotely located co-workers can work on a draft together instead of sending around various versions by e-mail.

"Once people experience this and see how

*"There is no shortage of funds from the investment community, since people believe that this is going to happen. If anything, too much funding is available, because it leads to some crazy things."*

Tom Eyslin,  
chairman and CEO  
IP telephony wholesaler ITXC

much more productive they can be, it will take off," Schriftgieffer says. (See story, page 56.)

And such basic collaborative applications are just the tip of the iceberg. Carriers are using the applications and low-cost telephony services to build up an installed base of IP telephony users. When the base gets big enough, carriers will be able to offer all kinds of new services — such as universal messaging and truly integrated self-help videoconferencing — that were heretofore technologically or economically unfeasible.

"The voice bits will be virtually free," says Thomas Fitzpatrick, group vice president in charge of Nortel's Meridian Communications Solutions in Santa Clara, Calif. "The carriers will

make their money by offering enhanced services."

Bill Jefferis, director of access services at Bell Atlantic Network Integration, says convergence will allow carriers to better optimize their networks for hosting applications for users, including directory services and intranet/extranet offerings. "All this will be tied together with strong quality-of-service [QoS] guarantees and service-level agreements both on the applications and the network," he says.

### Rebuilding the infrastructure

Getting to that point will require significant upgrades to carrier networks. But carriers and investors, convinced the IP market will be huge, are building and investing furiously.

"Convergence gives us a chance to rebuild the network infrastructure," says Robert Lucky, corporate vice president of applied research at Bellcore in Red Bank, N.J. "The fact that it's IP is almost incidental."

The big carriers have to figure out how to build a secondary network and integrate it with their legacy infrastructures. But they have an edge: They know how to operate a long-distance business and how to market. They also have an embedded base of customers and a well-known brand in many places (see story, page 62).

However, the incumbents face eroding market share, and the stock market is reacting accordingly. A Qwest Communications is valued on potential, while an AT&T is valued on earnings. To turn and fight, the incumbents will have to endure an earnings decline over several quarters, and that is unpalatable. How much would they have to spend to overhaul their networks? No one we asked would even hazard a guess.

"There isn't anyone who understands the economics of this," Lucky says. "We're going to find out according to which companies go bankrupt."

Meanwhile, the start-ups with highly valued stock can go out and acquire other companies. It's as if they have a different kind of money to play with.

With all the capacity the newcomers are adding to the traditional carrier infrastructure, the backbones are in pretty good shape.

And increasing backbone capacity is a relatively simple matter. Wave-division multiplexing and dense wave-division multiplexing are being used to boost the capacity of existing fiber-optic networks by several orders of magnitude.

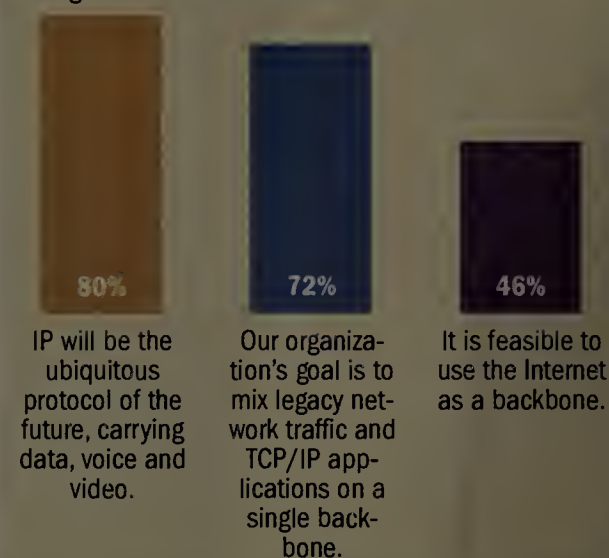
Fiber optics are on at least as steep a price/performance curve as electronics. Fiber purity and transmission quality are improving, so signals can go much farther before requiring amplification or regeneration. That saves on equipment and the real estate required to house it.

Fiber-optic networks have been hampered by the lack of equipment that can make routing decisions at speeds above DS-3, but this barrier is about to fall. Tellium in Edison, N.J. — a recently formed commercial spinoff from Bellcore — has a new optical cross-connect switch called Aurora that eliminates the need to de-multiplex optical signals into an electrical cross-connect that can only operate at DS-3 speeds.

"Before Aurora, the only way service providers could receive and transport such high-speed data signals was to upgrade their networks to SONET-based OC-192," says Farooque Mesiya, president

### GOING THE IP WAY

Readers were asked whether they agree with each of the following statements relating to IP. The following represent the percentage that either "completely agree" or "agree" with each statement.



SOURCE: NETWORK WORLD 500/PROGRESSIVE STRATEGIES

and CEO of Tellium. "This could easily amount to hundreds of millions of dollars."

Aurora can also make existing SONET networks more efficient by eliminating the expensive demux/remux process that SONET multiplexers and cross-connects require for every signal. Half to three-fourths of the traffic on public networks doesn't really need processing at any particular node because it's just passing through. Aurora offloads this burden by handling the pass-through traffic optically.

### The edge is the issue

New and expanded fiber capacity may have carrier backbones under control, but getting to

and from the backbones is where oversubscription occurs, causing real problems. If carriers don't oversubscribe the first hop, you can get PSTN voice quality from IP telephony. If they do, the initial router drops packets.

So the big infrastructure challenge is at the edge. The Telecommunications Act of 1996 hasn't resulted in a lot of competi-

tion because the incumbent local exchange carriers (ILEC) and interexchange carriers (IXC) have fought each other to a stalemate. More competition in the local-access market would attract a lot of private capital for building out the last mile.

The traditional LECs are doing quite well, largely because of the growth in second lines to homes. Their long-term prospects are more questionable, but local access is a tough market for competitors to crack.

IXCs face more near-term threats because long-haul service could become a real commodity in the future and erode their margins.

"The TCI acquisition shows how worried AT&T is about all this," Bellcore's Lucky says. The merger gives the long-distance giant TCI's cable TV infrastructure, which it can use for the last mile, cutting out the PSTN. AT&T is expected to run IP over these connections.

One of the inhibitors that all incumbent carriers

See No stopping, page 46

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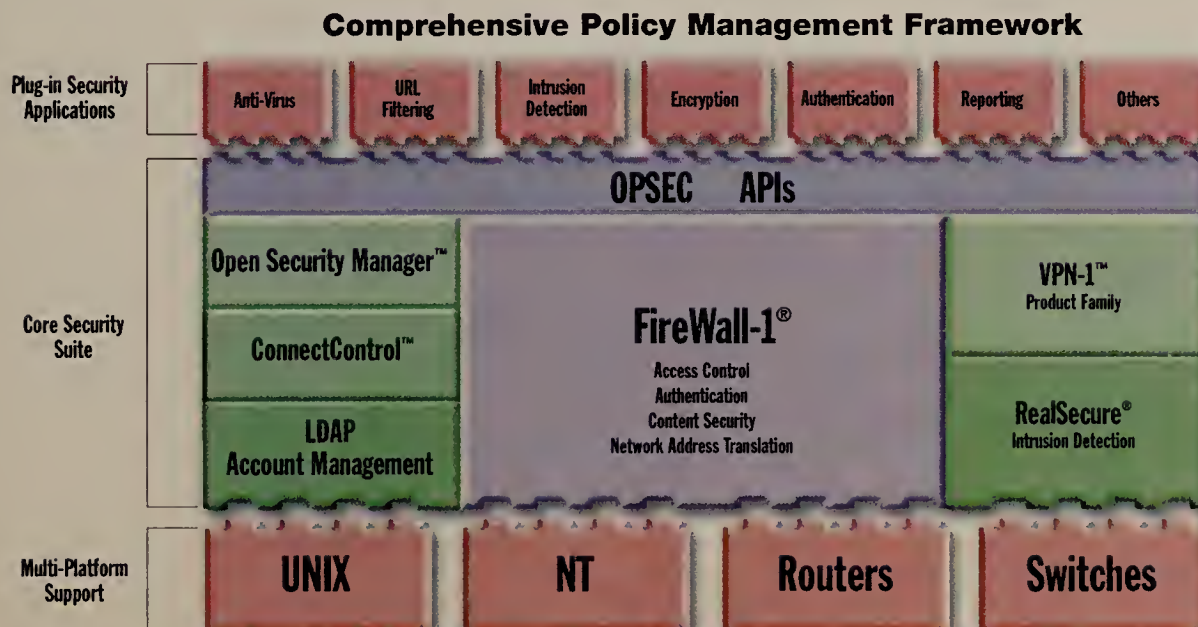
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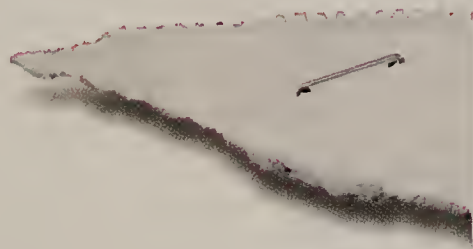
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*No stopping, continued from page 42*

face is their huge installed bases of PSTN equipment. A lot of it is quite new, ironically having been purchased to meet the demand for Internet access. It's not clear whether telcos can get any real investment life out of this equipment, which they typically depreciate over many years.

While depreciation schedules historically stretched to upwards of 30 years, they have accelerated, down to as few as nine years. But even that is an con in Internet time and stands in stark contrast to the three-year depreciation schedules for many data switches. In short, if forced to replace circuit switches before they are fully depreciated, carriers will essentially be paying for equipment they no longer use.

Depreciation inequities represent a significant handicap to incumbents, but some experts say it will be less of an issue once competition really bites. "Meanwhile, it's easy for them to say they can't do certain things because of depreciation," says John Matthews, principal consultant for Ovum, a London-based market research and consulting firm.

Another inhibitor is that while even modestly sized businesses often have persistent IP connections, there is no such thing over the last mile to residences. There are clearly opportunities for new access technologies, especially since a lot of people are getting second lines that could easily — and even preferably — be IP-based. But a huge investment is required to switch over this last mile.

"There is no shortage of funds from the investment community, since people believe that this is going to happen," ITXC's Evslin says. "If anything, too much funding is available, because it leads to some crazy things."

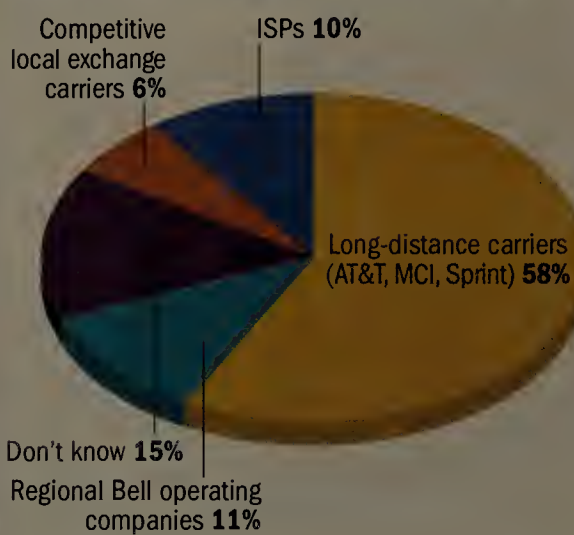
ILECs and competitive LECs are touting a confusing array of competing access options, ranging from traditional modems and ISDN to digital subscriber line (DSL), cable modems and spread-spectrum wireless technology. The front-runner for future buildout right now is xDSL.

"Last-mile services to customers must be integrated, providing both voice and data, because the backbone is integrated," says Martin Taylor, chief technology officer for DSL start-up CopperCom, Inc. in Cupertino, Calif. "Modems and ISDN are too slow, and cable and wireless aren't there yet. DSL is the only complete solution for the last mile."

However, even if DSL meets the most optimistic expectations, it will hook up a mere one million or so subscribers over the next couple of years. There will still be a vast number of people coming in over analog modems, and those calls will have to be circuit-switched.

"The winner will be the service provider that looks into the legacy edge network, which has an aggregate \$20 billion to \$30 billion in assets, including 130 million copper pairs," says Ron Vidal, senior vice president of new ventures for Level 3 Communications in San Francisco. "That's the big opportunity in the voice business right now, and the Internet guys just don't get it. They spend all their time worrying about sharing agreements in the core, and little or no time thinking about peering at the edge."

### WHO WILL LEAD THE MARCH TO CONVERGENCE?



SOURCE: NETWORK WORLD 500/PROGRESSIVE STRATEGIES

Companies that want to provide IP telephony services need to get organized as co-carriers so they can plug into the telco network as peers rather than customers, Vidal says. As peers they have access to telephone numbers and the Signaling System 7 (SS7) call signaling infrastructure, and can co-locate equipment in telco central offices (CO).

#### No price list

Carriers also have to figure out how much it'll cost to run converged IP nets and what to charge for services. Nobody claims to have the answers.

Before, pricing was based on time and distance, but that doesn't make sense in the new order, where exponential expansion of network capacity is collapsing time and space. Because certain overhead elements are constant regardless of call length, it doesn't cost carriers twice as much to handle a call that is twice as long — especially if plenty of available bandwidth is just sitting there waiting to be used. And the availability of increasingly cheaper bandwidth means it doesn't cost that much more to send something across the country than across town, even on circuit-switched networks.

Traditional telcos are also caught in a pricing dilemma. They don't dare cut prices across the board and thus lose revenue from customers who aren't price-sensitive, or who don't have time to think about it. Similarly, the telcos face the danger of cannibalizing their own installed base, so it's hard for them to proceed aggressively. The newcomers don't have this problem.

The cost of customer care is one of the real imponderables that hangs over the whole convergence issue. As more customers come aboard, the customer base gets increasingly naive. The first users were technologically savvy with high-end machines, and service providers had enough trouble even with them.

"People can't stop to figure this stuff out," Lucky says. "We don't have the time, and no one understands it in any case. We have a clean sheet of paper here, and that's a scary thing."

Traditional carriers have huge businesses built on circuit-switching revenue. The physical infrastructure, billing systems, order-entry systems, network management and customer service are all organized around circuit switching and have

to be re-done. Apply that to 13,000 COs in the U.S. that differ according to the equipment, copper and fiber lines they have and the services they offer. The cost of replacing mere switches pales by comparison.

#### Bigger, better switches

Another convergence impediment is the per-port cost of IP switches. IP telephony equipment costs about \$1,000 per line, compared with \$150 for analog lines. Transmission is cheaper, but the end-point equipment is still a lot more expensive.

"The cost of the IP switches has to come down before we can expand our IP telephony services broadly," says Howard McNally, vice president of transaction services for AT&T.

Scalability is also an issue, although it is improving rapidly. PSTN circuit switches typically have about 10,000 ports, but the highest density found in IP switches is 96 ports. While IP ports handle multiple calls, the industry still needs to come up with much bigger IP switches if they are to replace traditional CO equipment.

IP equipment also has a ways to go in terms of software. In voice networks, signaling data runs on a separate real-time network that provides added security — the SS7 net. In the IP world, there is very little notion of signaling, and everything is in the same hacker-vulnerable network. If the network drops the message indicating the end of a session, the customer could get billed for days instead of minutes.

Vendors are starting to incorporate SS7 capabilities into remote access platforms. Ascend Communications recently announced a gateway module that enables its carrier-class MAX TNT WAN access switches to communicate with the SS7 net. Service providers can deploy the Ascend switches to divert data traffic away from voice switches.

Such products aren't available yet, however.

"IP equipment still lacks a lot of the features and functions of circuit switches, such as the ability to put a call on hold, or do call forwarding, credit card calling or 800 numbers," says Michael Day, senior director of network evolution planning for Alcatel Network Systems in Richardson, Texas. "It will take some time to get a full set of voice features into IP equipment."

IP equipment also lacks the large-scale directory databases that run on parallel computers. And, of course, public IP networks need to have QoS levels

*"The cost of IP switches has to come down before we can expand our IP telephony services broadly."*

Howard McNally, AT&T

#### MEASURING EFFICIENCY — CIRCUIT VS. PACKET

Joseph Rinde, director of switch network architecture for MCI's Internet architecture department, says you shouldn't generally load a packet- or circuit-switched network to more than about 50% of capacity. Therefore, to support a 64K bit/sec voice connection, you have to allow for about 128K bit/sec of bandwidth. Similarly, to support an IP voice call at 10.3K bit/sec, which should give you good quality, you have to allow for 20.6K bit/sec of network capacity.

So the real comparison between how efficiently the public switched telephone net (PSTN) and IP each handle a voice call is:

**128K for PSTN vs. 20.6 K bit/sec for IP**  
**The IP advantage is 6.2:1**

If there is silence in both directions for 7.5% of the time, the IP advantage becomes 7:1, Rinde says.

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before they can scale to replace the PSTN.

An emerging class of high-speed IP switches can read the beginning and end of packets at line speeds, a capability that will go a long way toward enabling QoS in IP environments.

Marlborough, Mass.-based Nexabit Networks is breaking new ground with a product that offers multiterabit switching capacity in a single chassis. The NX64000 routing switch can forward 6.4 terabits per second and will support up to 64 OC-48 (2.4G bit/sec) connections or 16 OC-192 (9.6G bit/sec) links. Nexabit built in eight QoS queues per interface so the switch can handle voice and other time-sensitive traffic.

NX64000 is now in beta testing, with commercial release scheduled for October. Juniper Networks, based in Mountain View, Calif., plans to deliver a similar product before year-end.

Reliability issues also have to be addressed. Telephone networks are developed to meet a "five nines" standard of minimum reliability, meaning that the network has to be up 99.999% of the time. The telephone networks achieve this in part through the use of special-purpose, rather

static equipment — such as telephones — at the end points.

Data networks, on the other hand, have traditionally traded a certain amount of reliability for added flexibility. Users interface with them through general-purpose PCs that are constantly changing.

"How many people haven't rebooted their desktops this year?" asks John Hart, chief technology officer at 3Com in Santa Clara, Calif. "It doesn't help to get the network to 99.999% reliability if the desktops are less reliable."

### IP improvements wanted

Similarly, the network is only as fast as its slowest component. The ability to provision end-to-end QoS is at the top of the list of things IP still needs, and variable QoS on the Internet is still at least a couple of years away. Some service providers are approximating it by using private network segments to avoid congested areas on

the public Internet. However, such transmissions don't get the full economic benefit of using the public backbone.

Some say a lot of the latency and QoS issues can be mitigated by throwing bandwidth at them.

"Then you don't have to resort to IPv6 and Resource Reservation Protocol and the like," Level 3's Vidal says.

Others insist these problems are best addressed by managing bandwidth.

"Over-provisioning can work in the campus environment because bandwidth is so cheap there," says Lucent's Schriftgieffer. "But in the WAN, the management approach is going to win. We have to use ATM to

do QoS right now, but in the long run ATM will probably disappear."

Vendors and service providers also want to see more standards so more of their equipment inter-operates. Wish lists include standardized IP-to-

*"Building up the telephone network to satisfy . . . growth is out of the question. That's why circuit switching is doomed."*

Peter Sevcik, Northeast Consulting

## IP OPINIONS By Cathy Gadecki and Christine Heckart

# Don't expect the world from IP

The rapid pace at which issues are polarized and extremist positions are created in this industry is absurd. If telecom technologies were people, the population would be made up of only supermodels and super-ugly ducklings.

IP convergence is the latest telecom issue receiving the traditional black-and-white treatment. There isn't a single major service provider that will be delivering all of its voice, data and video services over an IP network next year. No one is even close to reaching this panacea, although several carriers have admirable visions. Significant hurdles and questions remain, and the potential payback is still being explored.

We certainly don't dispute that IP has become the default protocol for data. The protocol also is well-suited for store-and-forward applications such as voice mail and streaming applications such as broadcast. But can IP cost-effectively support real-time voice applications in a high-quality manner? Some industry watchers already say yes, but many say no.

When voice is integrated with directories and other desktop applications, it probably will run over IP. But when voice is a real-time, stand-alone application, the benefits of using an IP infrastructure are partially dependent on what happens to pricing for traditional voice services. This pricing will affect the decisions of service providers, residential customers and businesses alike.

Legacy data applications may not migrate to IP any faster than traditional voice. Many businesses don't consider a big IP free-for-all acceptable for mission-critical applications. And IP doesn't yet offer granular service levels that can be guaran-

teed to specific applications, services or users on an end-to-end basis. Service provider and enterprise networks will remain segregated until IP can provide much more granularity in quality of service and bandwidth guarantees end to end. And even after IP gains that capability, you won't see the world change overnight.

Another big question is that of benefit. Everyone is assuming there is a major cost savings associated with convergence, which may be true. But for service providers, network costs only account for 15% to 20% of the total cost of offering a service, so how beneficial would it be to save 70% on the network? Unless service

providers' entire organizations can be converged and thus lots of duplication (and jobs) eliminated, the savings from the network alone probably isn't enough.

Service providers that want to move all their networks to IP also face the following technical and business issues:

- How is bandwidth reserved for specific applications, customers or service classes? How will this be tied to pricing and billed?
- Is it really less expensive to migrate all networks and services to a single infrastructure? How long will the transition take, and how will it affect customers? Can a single network scale to meet the new level of traffic volume? How are legacy back-office systems tied into the new architecture?
- What troubleshooting tools exist for isolating and resolving problems? Do operations personnel know how to use these tools?
- How are value-added voice features and services, such as call forwarding, caller ID and time-

of-day routing, supported over the IP network?

These issues are just the tip of the iceberg. Even the new facilities-based providers that were formed to build single, integrated networks have started out slowly by building many segregated ones. They, too, face the challenges of integration going forward. And until most of these problems are solved, integrating everything over IP will remain a goal, not a reality.

Businesses don't have to wait for these networks of the future to consolidate their applications over IP. But how quickly will companies really do this? Managers will need to change their ingrained behaviors and biases, realign their organizations, redesign their networks and make new investments. Even if the technical bugs can all be addressed today, there are big hurdles for businesses to overcome related to consolidation. And few businesses have the luxury of excess IT resources to work on the opportunity — most are out fixing problems and fire-fighting.

At various points in the past 10 years, ISDN, ATM and cable and telephony were supposed to integrate everything and change the world of networking as we know it. Now we want the same thing from IP. The expectations we place on new ideas and technologies are always so enormous that it's amazing any survive the downfall into reality.

IP is not likely to eliminate world hunger, bring everlasting peace or unite the world's religions. And IP isn't likely to join all the nations' segregated networks in the next couple of years, either. The question is, will it make a dent?

Gadecki is a director for and Heckart is vice president of TeleChoice, a consultancy in Owasso, Okla. They can be reached at [cgadecki@telechoice.com](mailto:cgadecki@telechoice.com) and [heckart@telechoice.com](mailto:heckart@telechoice.com).



Gadecki & Heckart

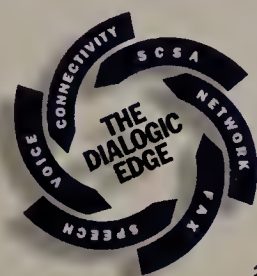


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ATM transfers, cross-checking between policy servers and standardized billing methods.

Essential standards work is being done by the Internet Engineering Task Force's Differentiated Services Working Group. The committee is working on standard

methods for providing different classes of service across the public Internet.

One is a mechanism for using the Lightweight Directory Access Protocol to map user profiles to different services. This would enable edge devices to play the role of ticket agents, identify-

ing various types of users and data and relegating them to first-class, coach, steerage or the like.

Industry experts expect differentiated services to be offered first on "private Internets" within a single service provider's infrastructure. Then two ser-

vice providers will enter into bilateral signaling agreements that will enable differentiated services to be offered across their networks. Gradually, more providers will join in, and eventually the entire public Internet will be included.

"It's as if the Internet is a biological organism," Bay's Howe says. "It has no long-term strategy and moves in tactical steps instead of according to some master plan."

#### No turning back

Maybe so, but one thing is clear: The IP convergence train has left the station. Some of the passengers are wildly enthusiastic about the journey, and others are being dragged along kicking and screaming as they enumerate IP's many flaws. But whatever its shortcomings, IP is a done deal — it's the standard that got adopted, period. It has so much momentum and development action there is nothing else on the horizon.

Network managers won't be disconnecting from the traditional voice network over the next couple of years. Local IP networks have to connect to the telco infrastructure in a seamless fashion so enterprises don't have to buy separate equipment and employees don't have to punch in a lot of numbers just to tell the network who they are and who they're calling.

But you will gradually see more applications that handle multimedia converge onto IP networks. Enterprises will start with functions such as customer service that offer an immediate payoff. Convergence will spread from there as new applications are developed. Eventually, it will move from the intranet to the extranet and on to the public network.

When will this last stage of the transition begin? Estimates vary widely, but it will certainly be before the first decade of the 21st century closes, and very possibly as soon as five or six years from now.

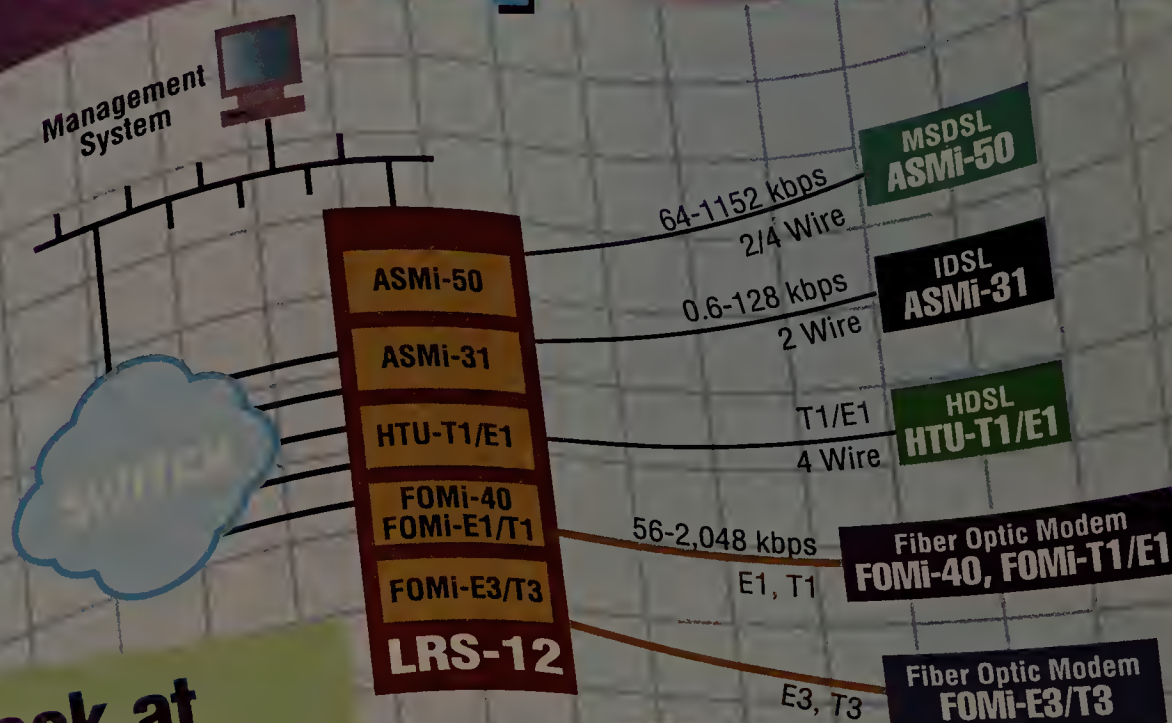
"Major industry participants are investing in and rolling out products, and ISPs and telcos are rolling out services to create a market," says Neville O'Reilly, director of enterprise consulting for TeleChoice, a consultancy in North Brunswick, N.J. "We have to have the whole system in place, so it's still a cart-before-the-horse problem. But we're reaching the point where we can start putting solutions together."

IP lets general-purpose and special-purpose machines talk together in a way that wasn't possible before. Right now, we have a specialized network sitting between those machines. That network does what it was designed to do — voice — very well. But we need a general-purpose network now because the key application isn't voice anymore.

*Breidenbach is a consultant and freelance writer in San Mateo, Calif. She can be reached at sbreidenbach@usa.net.*

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# Regulatory issues may reach out and bite IP

By David Rohde

**I**f you believe IP networks are poised to take over the world because the telecom industry is all balled up in regulations, remember: Turnabout is fair play. The actions of regulators — who have finally discovered that unregulated Internet services are competing with mainstream voice and data offerings — could just as easily squelch IP dominance.

Except for its ill-fated attempt to regulate indecent content, the government has tried to keep its hands off IP and the Internet. In 1996, Congress wrote language into the Telecommunications Act calling for a “free and unfettered” Internet market. Last year, the White House issued a white paper calling for Internet noninterference. And last spring, the Federal Communications Commission for the third time refused to make ISPs pay telephony-style per-minute access charges to local exchange carriers.

Nonetheless, numerous FCC actions unwittingly affect the prospects for IP voice and data convergence simply by changing the calculus between circuit-switched and packet-switched transport choices. Case in point: Dial-up international voice, fax and file transfer connections. If the FCC succeeds in its current policy of jawboning down foreign carriers’ rates, the need for international IP telephony will suddenly abate. Similarly, flat-rate dial-up Internet pricing plans may fall victim to FCC action.

## Aching for broadband

The hottest telecom issue at the FCC right now is right down IP Alley. And depending on whom you ask, the FCC’s decision will either bolster IP convergence or put it in the toilet.

Four of the five regional Bell operating companies — all but BellSouth — have filed petitions asking the FCC to deregulate their broadband data operations. Their hook: an obscure provision of the Telecommunications Act of 1996, known as Section 706. It calls on the FCC to refrain from applying certain regulations to broadband networks. This month, the FCC faces

a deadline by which it must say which regulations it will drop, or at least issue a proposal.

The RBOCs have seized on this previously ignored piece of the statute to demand the FCC allow them to carry interexchange data traffic across their regions, even before they receive general long-distance authority. They add that when it comes to data services, the FCC should drop long-standing requirements that force RBOCs to resell their offerings to other carriers or make their facilities available to competitors.

Without such rule changes, the RBOCs say, they have little economic incentive to invest in broadband networks optimized for IP, including digital subscriber line local loops. But with the rule changes, the carriers say they could compete with tier-one Internet providers and in the process add desperately needed capacity to the Internet.

FCC Chairman William Kennard is receptive to

the RBOCs’ Section 706 petitions. “[The RBOCs] have rightly asked, ‘Why should we make this new investment if we simply have to turn around and sell this new service or the capabilities of these advanced electronics to our competitors?’” Kennard said in a recent speech.

Long-distance carriers, ISPs and competitive local exchange carriers are frantic to make sure RBOC data nets don’t get deregulated this way. Mark Rosenblum, AT&T’s vice president of law and public policy, says the RBOC petitions are a ruse. “They’re just going to shift their voice traffic onto the new [deregulated] network,” Davis says, noting that this would defeat the rule requiring RBOCs to meet a 14-point checklist in order to enter the general long-distance business.

Kennard has tied the issue to the need for bringing more bandwidth to schools, libraries and residences, almost all of which count on the RBOCs for “last mile” services. And that’s been the main cue for the staff of the FCC’s Common Carrier Bureau, which has drawn up a draft proposal supporting the Section 706 applications. Should the RBOCs prevail, the next question is whether they will follow through and rapidly

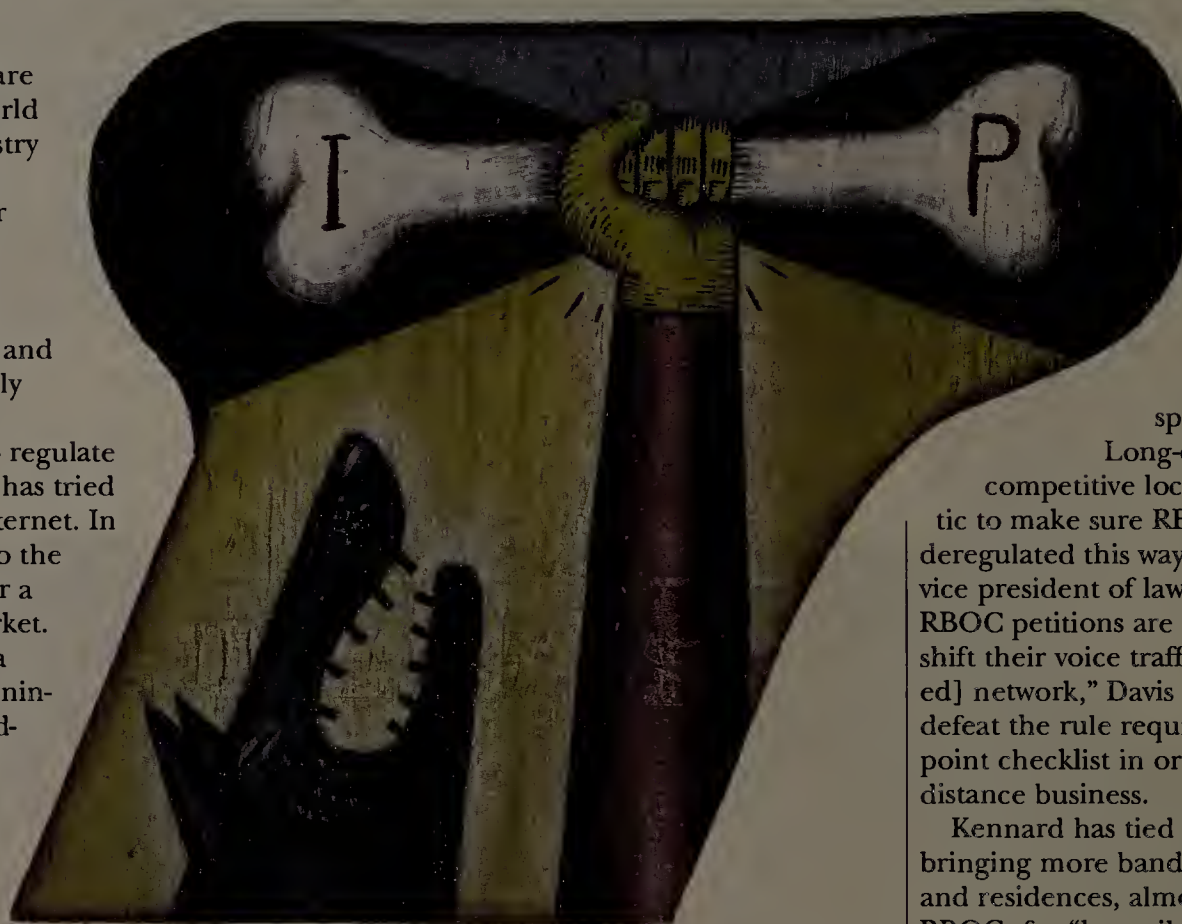
build out multimedia broadband IP networks. That may be the ultimate test of any change in FCC policy.

## Saving international circuit switching

Another key FCC policy affects IP convergence in a different way. Every IP telephony gateway vendor cites the high cost of international connections as creating a prime hunting ground for IP convergence. But

last year, the FCC passed a rule demanding that major foreign carriers reduce their settlement rates — fees they charge to complete traditional calls that originate in the U.S. — to 15 cents or less by Jan. 1, 1999.

See Regulations, page 54



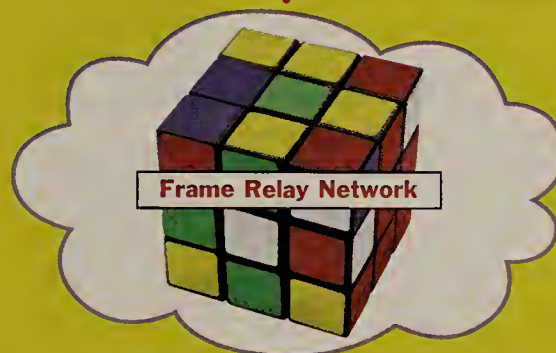
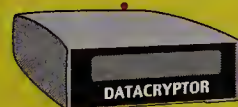
*If the FCC succeeds in jawboning down foreign carriers’ rates, the need for international IP telephony will suddenly abate.*

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*Regulations, continued from page 52*

The international reaction: shock and horror. More than a dozen foreign carriers sued the FCC, claiming it had no business regulating international rates. Even Cable & Wireless plc, whose U.S. subsidiary is a significant domestic corporate voice and data carrier, sued the FCC in federal district court in Washington, D.C., seeking to protect its right to set rates for foreign subsidiaries such as Hong Kong Telecom.

Others are turning the IP bypass issue around and claiming the FCC is actually seek-

accessing foreign Web servers.

Yet the FCC's policy seems to be working. Settlement rates and international rates are coming down dramatically in many cases. Commercial offers of calls to Great Britain at 10 to 15 cents per minute and to continental Europe for no more than 25 cents per minute now abound, even for residential customers.

"I tell my customers that if they're moving toward Internet telephony just for the cost savings, that difference is eventually going to go away," says Al Bender, general manager of voice-over-IP solutions at Nortel. Len Elfenbein, president of international consultancy Lynx Technologies in Fairfield, N.J., suggests users monitor settlement rates to negotiate lower circuit-switched prices while employing IP alternatives for recalcitrant countries that keep their ordinary charges inflated.

**The per-minute tax**

One controversial issue that seems to have faded into the background is the failed RBOC drive to make ISPs pay them per-minute access fees just as long-distance carriers do.

In May, the FCC agreed to study the idea of assessing access fees on phone-to-phone IP telephony. Most ISPs expressed relief, saying they had once again staved off the possibility of the bulk of Internet traffic being "taxed" at a per-minute rate.

But political experts caution against complacency. The main reason the FCC has repeatedly declined to impose RBOC access fees on ISPs is that those fees are inflated, not because the FCC inherently favors Internet traffic. Now

running 2 to 2.5 cents per minute, RBOC access fees are slated to come down gradually; by 2002, they will be little more than 1 cent per minute.

Sometime between now and then, if IP traffic actually begins cutting into the aggregate traffic carried by the public switched telephone network, the FCC may be forced to treat ordinary long-distance and Internet traffic alike. If the FCC does move in that direction, what remains of flat-rate, all-you-can-eat, dial-up Internet pricing plans will be history.

Numerous other issues could change the outlook for converging networks around IP. For example, few LAN-based telephony manufacturers — what some in the industry dub "unPBXs" — have yet complied with federal regulations that require phone systems to address public safety issues.

And the ongoing issue of charging sales tax on the Internet could retard electronic commerce, though Congress seems poised to pass a three-year tax moratorium while policy makers examine the issue more fully (see graphic).

One thing's for sure: Internet issues are no longer flying below the radar screen in Washington. With antitrust regulators taking on Microsoft, egged on by newly pointing-and-clicking congressmen, the effect of nearly every communications decision regarding the world of IP is likely to be closely examined.

*Rohde is a Network World senior editor of carrier services, telecommunications equipment and computer-telephone integration. He can be reached at david\_rohde@nww.com.*

*Internet issues are no longer flying below the radar screen in Washington.*

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We'll help with your IP convergence homework. We've assembled a comprehensive package of background articles, white papers, newsletters and other resources related to the move to all-IP networks. Included are opinion columns written by John Sidgmore, CEO of UUNET Technologies, and Marty Kaplan, senior vice president and chief technology officer at Sprint. From SNA migration to carrier IP plans, from downloadable IP telephony clients to copies of convergence-related standards, you'll find more background on Network World Fusion.

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ing special favors for U.S. Internet users. Telstra, Australia's dominant carrier, claims in its lawsuit that the FCC is being hypocritical in complaining about high international settlement rates. U.S. carriers are overcharging foreign carriers for international capacity needed to support Internet traffic, Telstra says, especially now that U.S. users are increasingly

**THE FCC IS AN IP PLAYER**

On numerous issues, the federal government is heavily involved in the world of IP convergence, whether it wants to be or not:

	RBOC broadband networks	Telephone equipment regulations	Internet access fees	International settlement rates	Taxation
<b>Issue</b>	<ul style="list-style-type: none"> <li>The FCC is considering deregulating broadband data services offered by regional Bell operating companies.</li> </ul>	<ul style="list-style-type: none"> <li>The FCC requires PBXs to support public-safety features, such as the ability to identify the exact location of a phone used to call 911.</li> </ul>	<ul style="list-style-type: none"> <li>Long-distance carriers pay per-minute origination and termination charges to local phone companies on circuit-switched calls. ISPs do not pay these fees on Internet sessions.</li> </ul>	<ul style="list-style-type: none"> <li>A new FCC rule requires that by Jan. 1, 1999, foreign carriers in industrialized nations reduce their settlement rates — the international equivalent of RBOC access fees — to 15 cents per minute or less on U.S.-originated connections.</li> </ul>	<ul style="list-style-type: none"> <li>Several states impose sales taxes on Internet transactions. But bills passed by the Senate Finance Committee and the full House of Representatives would put a two- or three-year moratorium, respectively, on such new taxes.</li> </ul>
<b>Upshot</b>	<ul style="list-style-type: none"> <li>Deregulation would mean RBOCs could offer broadband IP services across their regions even before they get general long-distance authority. Other carriers claim RBOCs would then shift voice traffic to these new networks, undermining the telecom reform process.</li> </ul>	<ul style="list-style-type: none"> <li>Few if any IP and LAN telephony systems comply with these regulations but could be subject to them.</li> </ul>	<ul style="list-style-type: none"> <li>If ISPs were forced to pay these access fees, dial-up Internet service would probably become more expensive.</li> </ul>	<ul style="list-style-type: none"> <li>Exorbitant settlement rates contribute to high international calling costs. If the rates come down, the need for IP alternatives lessens.</li> </ul>	<ul style="list-style-type: none"> <li>Widespread taxation would not only make electronic commerce more expensive but also add to its operational complexity.</li> </ul>
<b>Prognosis</b>	<ul style="list-style-type: none"> <li>Under a congressional deadline, the FCC must at least issue a notice of proposed rule-making on the subject this summer.</li> </ul>	<ul style="list-style-type: none"> <li>The issue is likely to lie beneath the surface until IP-based telephony CPE gains market share.</li> </ul>	<ul style="list-style-type: none"> <li>The FCC is currently considering imposing access fees only on IP telephony, not IP data applications. But political pressure remains for the agency to assess access fees on all Internet traffic.</li> </ul>	<ul style="list-style-type: none"> <li>Several foreign carriers have sued the FCC over this rule, claiming the U.S. agency has no business regulating international traffic. Still, the pressure is working and settlement rates are falling.</li> </ul>	<ul style="list-style-type: none"> <li>If the full Senate passes the bill and the two houses reconcile their terms, President Clinton is virtually certain to sign it.</li> </ul>

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## Product Spotlight

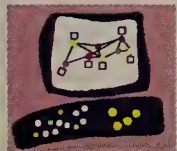


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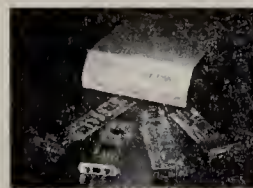
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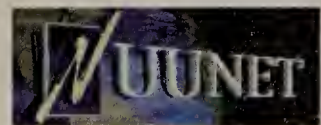
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# Users speak

*Pioneers are dabbling with IP convergence and showing the promise it holds, but wholesale migrations aren't yet in the cards.*

By Neal Weinberg



**K**anematsu USA, a subsidiary of a Japanese import/export company, has slashed its international phone bill 60% to 70% by sending voice and fax traffic from eight U.S. branches to Japan over the public Internet.

More than 100 faxes per day and voice calls from about 50 Japanese-speaking employees are funneled through a Lucent Technologies Internet Telephony Server located at Kanematsu's New York office, then across the Internet to Tokyo and Osaka, says George Emmett, assistant telecommunications manager.

As with any new technology, there were initial bugs to work out. When Kanematsu first installed a beta version of the system last April, the echo was so severe "it sounded like you were talking in a bubble," Emmett says. The delay was so bad,

even fax transmissions got disconnected. After several upgrades from Lucent, the quality is now acceptable, but Emmett has no plans to risk moving domestic voice traffic onto the Internet.

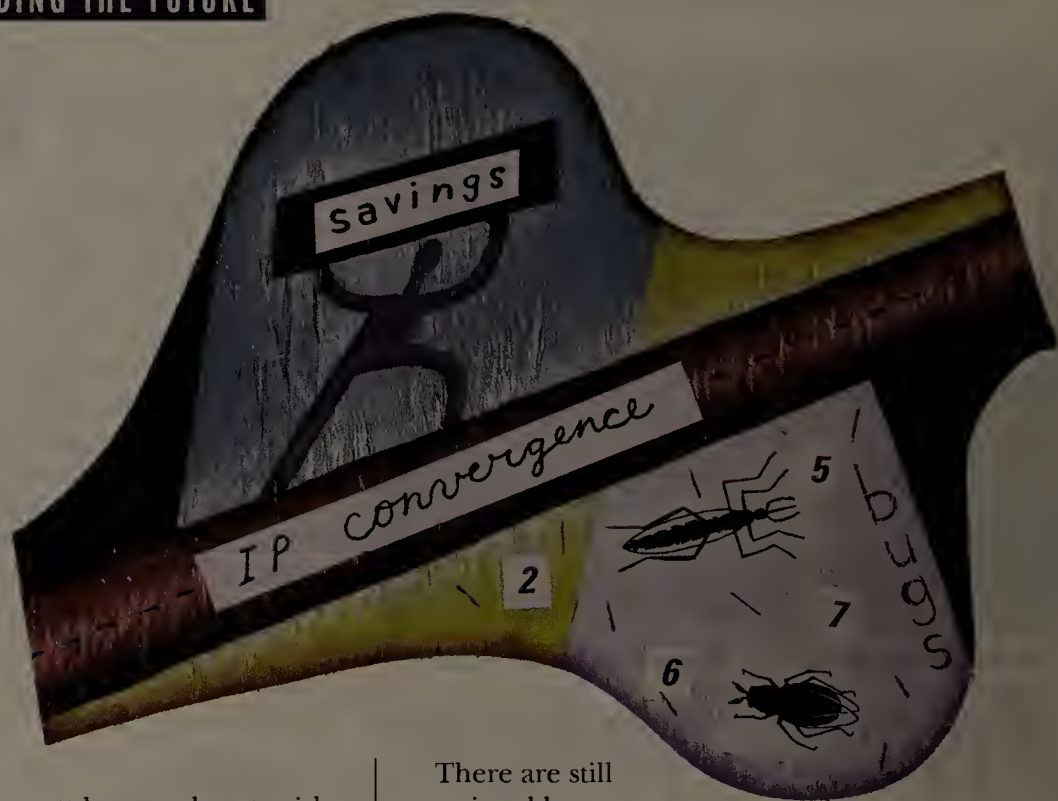
Such is the state of IP convergence circa mid-1998. Pioneers are dabbling with the technology at the fringes of their networks, installing IP gateways to provide cost savings and more efficient use of bandwidth. We are beginning to see the potential IP holds for bringing together the voice, video and data worlds, but nobody yet is embarking on major infrastructure changes aimed at creating a fully converged IP network or large-scale domestic voice deployment (see story, page 58).

The most popular early applications are IP voice and fax over the public Internet, especially for international calls, and IP voice over frame relay nets. Companies are also experimenting with IP for videoconferencing and Web-enabled call centers, and to support voice over wireless nets.

## Sold — to a point

Universal Sewing Supply is saving \$2,300 per month on its international phone bill by zipping 20 voice calls and 30 faxes per day over the public Internet from its St. Louis headquarters to sites in Santo Domingo, Dominican Republic.

A year ago, when Universal Sewing first installed two voice-over-IP gateways from VocalTec Communications, latency problems were so bad the \$27,000 system was unusable, says Technical Systems Administrator Curt Geiler. Today, thanks to software revisions from VocalTec and hands-on support from Motorola, voice quality is "on a par with [the public switched telephone network] a majority of the time," Geiler says.



There are still occasional latency problems, however, and sometimes a call can't be completed because of Internet congestion. Overall, though, the cost savings associated with IP over the Internet for international traffic outweighs concerns about voice quality, Geiler says.

While the initial experiment has proven successful, Geiler doesn't expect Universal Sewing or any large company to move a significant amount of voice traffic onto the public Internet until it becomes more stable and reliable, such that carriers offer service guarantees.

In the meantime, an alternative to the Internet is to run IP voice over frame relay networks. About a year ago, Amcore Financial pulled its data traffic off its leased-line, time-division multiplexer (TDM)-based net and moved it to a frame relay service from MCI Communications.

Amcore's 65-site frame relay network provided the performance, flexibility, scalability and cost savings the Rockford, Ill., banking company was looking for. But there was a hitch: "It left us with parallel networks," says Bob Davis, network operations manager.

Just about the time Davis was looking for a way to ditch the dedicated lines altogether, Cisco Systems came out with a module that allows its 3600 series routers, which Amcore already used, to handle voice-over-IP traffic.

So far, Amcore has IP voice over frame relay running on its five most expensive leased lines. For an investment of \$5,000 per router, or \$25,000, the bank expects to save \$70,000 per year in dedicated line costs, Davis says. Sound quality has been fine, although he says some users grumble about having to learn new phone numbers and access codes. He plans to add IP voice at 20 more sites.

Still, Davis can't envision the bank swapping out its existing phone equipment for an all-IP network. "I don't see it happening for some time," Davis says. "There's some pretty old stuff still in place, and if we can get use out of it, we will."

For Computer Services in Valparaiso, Ind., conserving bandwidth was the prime motivation behind the decision to add IP voice to its 15-node private frame relay network. Telecommunications Manager Perry Sheetz says when he first ran voice over frame relay, he had to nail up a



George Emmett worked through problems with early versions of his IP voice gateways and now has Kanematsu USA saving 60% to 70% on its international phone bill.

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permanent 32K bit/sec connection to accommodate the traffic.

The voice compression features of a voice-over-IP gateway from Micom Communications allow him to support the same volume of voice traffic with only 8K bit/sec of bandwidth. This will help him stave off additional T-1s as his overall traffic increases.

#### IP without wires

Similarly, Amoco was running out of bandwidth on the wireless TDM net that ships voice and data from 38 oil rigs off the coast of Trinidad. The wireless net connects the rigs to a central office on the Caribbean island, while private lines ferry traffic to the U.S. Amoco is replacing the private lines with frame relay service from MCI. As part of the transition, the oil company is installing gateways from Nuera Communications that bounce IP voice from the offshore rigs off a satellite and onto the island at 9.6K bit/sec.

Raymond Weller, international telecommunications analyst at Amoco, is bullish about the Nuera equipment. "The savings on bandwidth is just tremendous" compared with TDM, and the voice quality is "superb," he says.

IP also helps Weller with some addressing problems associated with the offshore platforms. The eight main rigs and 30 satellite rigs move into new physical configurations every few months. Before he installed the IP gateways, each time there was a change, Weller had to remap the data link control identifiers on the frame relay router at the Trinidad office to create new frame relay subnets for each new combination of rigs and satellite rigs. Weller describes that process as "a nightmare." Now, Weller is able to avoid a fullscale reconfiguring of the frame relay network by using the gateways located on the rigs to direct offshore traffic. When the main rigs and their satellite rigs move, Weller simply changes the IP addresses for the ships, which can be done with a single command.

Another company sending IP voice and fax over wireless links is PCS Phosphate Company, headquartered in Aurora, N.C. Until recently, the mining company had to pay its local phone company \$15,000 whenever it moved its mining operations from one location to another, which typically occurs two or three times per year. PCS min-

# No need for IP here



While many organizations are making strides toward IP convergence, not many are using IP for domestic voice in a big way.

Robert Grant, director of corporate telecommunications at Textron, a Fortune 150 company in Providence, R.I., says he pays only 4.5 cents per minute for intracompany long-distance calls under a Tariff 12 contract with AT&T. Those internal calls only constitute 10% of his total voice traffic, so there's just not that much incentive to devote a lot of time delving into the IP issue, Grant says.

Not that he is dismissing IP totally. Grant says IP may play a role in international traffic, especially since Textron does business in 150 countries. His plan is to "keep it on the radar screen," and revisit the issue "if within three or four years it gets perfected and works around the world."

— Neal Weinberg

ing trailers are located in remote areas, and large cranes and other equipment interfere with above ground wires. So the company had to pay to bury phone lines underground.

In June, PCS began using a Micom voice-over-IP gateway and wireless equipment from Solectek to bypass the PSTN, says Rick Lehner, supervisor of information services. The company created eight wireless IP links — seven for voice and one for fax — between a mining trailer and the main processing facility eight miles away. PCS expects to recoup its \$50,000 investment in less than two years, Lehner says. From then on, it will incur only the expense of moving dishes and other equipment associated with the wireless setup. Lehner reports the quality of the 8K bit/sec voice is excellent. But he has no plans to swap out the firm's PBX because it still provides features that can't be matched by IP voice products, such as automated call-back and the ability to assign restrictions to certain classes of traffic.

at the online supermarket.

But for customers, using the IP voice connection requires some effort. In addition to having a PC equipped with a full-duplex sound card and microphone, shoppers have to download a plug-in from IDT in Hackensack, N.J.



Lockheed has engineering teams in England, Texas and California using IP videoconferencing to collaborate on the design of a new aircraft, the Joint Strike Fighter.

That kind of inconvenience on the customer end, along with concerns over security and voice quality, may explain why only 1% of companies have Web-enabled call centers, says Robert Mirani, senior analyst at The Yankee Group, a research firm in Boston.

As vendors satisfy those concerns, Web-enabled call centers will increase in popularity, Mirani says. He predicts 10% of call centers will be Web-enabled by 2000,

and 33% will be enabled by 2002.

While voice is the most oft-cited new IP application, IP video perhaps best illustrates the benefit of carrying all types of traffic on one pipe.

The University of South Florida's Health Sciences Center has installed an all-IP network to link 28 departments scattered in a 20-mile radius. Using IP-based videoconferencing systems from VCON Telecommunications, the center's staffers and researchers can transmit voice, video and data from their desktops.

And a team from Lockheed Martin Tactical Aircraft Systems in Fort Worth, Texas, is in the early stages of a project aimed at creating a virtual design team that will conduct multiparty IP videoconferences using Lucent's MultiMedia Communications eXchange server. The goal is to increase collaboration among engineering groups working in England, Texas and California on the design of a new aircraft, the Joint Strike Fighter.

But Lockheed Martin has some obstacles to overcome, including securing enough bandwidth to support video and dealing with voice quality that isn't always up to snuff, says software specialist Wynn Jones. During the latest videoconference trial, Jones had to shut off the IP voice feature and revert to the PSTN to improve voice quality.

Weinberg is Network World's features reporter. He can be reached at [neal\\_weinberg@nww.com](mailto:neal_weinberg@nww.com).



Curt Geller says a year ago his IP voice gateways were unusable. But now they're saving Universal Sewing Supply \$2,300 per month on international voice and fax calls.

#### Web calls and video teams

An application that would seem to be a natural for IP voice but has been slow to catch on is the Web-enabled call center.

At [koshersupermarket.com](http://koshersupermarket.com), online shoppers with questions can click on an icon to initiate a voice call over the Internet to the company's customer service center — without interrupting their Internet sessions. "It certainly helps us close deals, and it makes it more convenient for the customer," says Alex Schleider, vice president of operations



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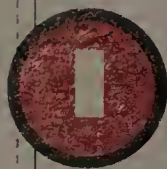
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# No shortage of standards



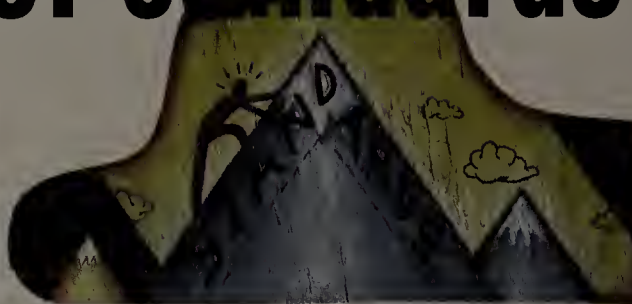
It's often said that the nice thing about standards is there are so many to choose from. In the multimedia world, that saying certainly rings true. Fortunately, the standards that fuel the IP convergence world are grouped into several functional families.

Here's how they break down.

## T.120 series

The T.120 series of recommendations, defined by the International Telecommunications Union's telecommunications standards division (ITU-T), defines protocols and services for real-time, multipoint data communications. Applications of these protocols include desktop data conferencing, whiteboard image sharing and still image exchange. The protocols can be used with a number of network infrastructures and services, including circuit- and packet-switched nets, LANs and ISDN lines. Examples of standards in this family include:

- T.120: system model
  - T.121: generic applications
  - T.122: multipoint communication services
  - T.123: audiographic and audiovisual applications
  - T.124: generic conference control
  - T.125: multipoint communication service protocol
  - T.126: multipoint still image protocol
  - T.127: multipoint binary file transfer protocol
- All of the protocols above are in final form



and have been implemented by a number of vendors.

## G.700 series

The G.700 series, also from the ITU-T, addresses technical aspects of terminal equipment. Of greatest interest are the recommendations for coder/decoders, the devices that transform analog voice signals into digital pulse streams. The standards in this family differ in the amount of bandwidth they consume and other characteristics, such as the ensuing processing delays that are required. The transmission speed specified by each is as follows:

- G.711: 64K bit/sec
- G.722: 48K, 56K and 64K bit/sec
- G.728: 16K bit/sec
- G.729: 8K bit/sec
- G.723.1: 5.3K and 6.3K bit/sec

All of the protocols listed are in final form, however the breadth of the implementations varies widely by vendor. In addition, many vendors implement proprietary (non-standard) codecs.

## H.320 series

The H.320 series, again from the ITU-T, governs basic video telephony communications over point-to-point and multipoint connections. Like the T.120 series, the H.320 family includes recommendations for a number of specific applications and network types, including:

- H.320: narrowband (1.92M bit/sec or less) visual telephone systems
- H.323: packet-based multimedia systems
- H.324: audio and video compression over modem connections

The related standard H.225 specifies call control; H.245 addresses media stream procedures; and H.261 and H.263 specify video codec operation.

Each of these standards has been finalized, and a second version of H.323 was recently released. Many vendors have implemented H.323, but users should check to see if they use Version 1 or 2, and if the vendors have verified interoperability with other implementers.

## Voice-over-IP protocol stack

Clearly, there are a lot of standards for vendors to deal with. But the International Multimedia Teleconferencing Consortium recently published its Voice-over-IP Forum Service Interoperability Implementation Agreement. This document recommends a protocol stack and shows how many of the protocols fit together within a consistent architecture. In addition to the ITU-T recommendations listed above, the Voice-over-IP Forum's work incorporates several Internet protocols, including the Domain Name System, Real-time Transport Protocol, Real Time Control Protocol, the User Datagram Protocol (UDP), IP and TCP.

— Mark Miller

## IP OPINIONS By Thomas Nolle

# Putting IP in perspective



It's hard to look around the network marketplace in 1998 and not see what appears to be an IP revolution. People who didn't know what networking was five years ago have their own Web sites today, and some experts are forecasting a future in which Internet connectivity is as ubiquitous as telephony. Maybe that will be so, but we've got a long way to go. U.S. public carrier revenue is nearly \$200 billion, and less than \$30 billion of the windfall can be attributed in any way to data services.

There's no question that data traffic will have an impact on the public carrier infrastructure. Often, the peak amount of bandwidth used by data applications is 10 to 100 times the peak bandwidth used in a voice call.

The current public network parcels bandwidth out in fixed multiples of 64K bit/sec, and it simply isn't efficient for bursty data traffic. As we move into the 21st century, 80% of carrier profits will come from non-voice services. More data

means more inefficiency, so we can expect the public network to change.

But saying that IP will drive a revolution in public infrastructure isn't the same as saying that the public infrastructure will be based on IP. IP can't reserve network resources to ensure application performance is up to snuff. As such, it isn't the ideal mechanism for carrying voice traffic, H.320 video or other forms of leased-line data. If optimum networks are the goal, moving from a strategy that isn't optimal for data to one that isn't optimal for voice is not logical.

Time-division multiplexing (TDM) is going to be replaced by a form of statistical multiplexing that lets applications use bandwidth in a way that is as bursty or as constant as necessary. But that doesn't mean traditional telephony will go away. The type of telephone switching that gives us dial tones in our homes and offices isn't going to pass away for decades, so switches and IP routers will have to share the transport network that replaces TDM.

We already know what that network will be: ATM. Recent ATM announcements by

Williams, Sprint and Bell Atlantic show that the facility-based carriers (which, after all, are financial successes) believe ATM is the multi-service architecture of the future.

This isn't to say that users will buy ATM services or premises equipment. ATM will be buried in the innards of public networks much the way Synchronous Optical Network (SONET) is buried now. It won't be a new kind of service, but a way of making the telephone services that are critical to users and service providers today coexist with the data services that will be critical to both in the future. IP has won the race as the User-Network Interface (UNI) for non-voice services in the future. That's a worthy victory, but the fact that IP is the best UNI doesn't make it the best infrastructure.

The marriage of analog voice, IP data, ATM transport and dense wave-division multiplexing optics is going to be interesting and exciting, but it will be difficult as the devil unless we accept what's really going on. Accepting IP's limitations as a network foundation doesn't diminish IP's importance as the foundation of all new profit-making applications. Trying to make IP into something it isn't hurts IP and networking for us all.

*Nolle is president of CIMI Corp., a technology assessment firm in Voorhees, N.J. He can be reached at (609) 753-0004 or tnolle@cimicorp.com.*



# Getting there from here

*Tips for planning your voice-over-IP migration.*

By Mark Miller



Looking to implement voice over IP? Better look before you leap — the market is exploding with new vendors, products and services. Some are ready for prime time, while others could benefit from a little more experience. Here are some tips to get you started:

- **Tap your existing resources.** In many cases, voice and data network responsibilities are handled by separate departments. Each may have a separate budget and an empire to match. There are likely two areas of expertise: circuit switching and traffic analysis on the voice side, and packet switching and IP knowledge on the data network side. Both skill sets are required for a successful voice-over-IP implementation, so make sure these two groups collaborate.

- **Know your traffic.** Make sure your data network can handle the traffic increase before you add voice to the mix. With steady growth of only a few percent per month, that DS-3 circuit you put in just last year may be getting close to its capacity during peak traffic periods. Verify that excess capacity exists before adding more traffic. In addition, get a handle on the number of hops between selected destinations and the resulting network latency, as these delays will dramatically affect the quality of the packetized voice and video service.

- **Measure performance.** End users will likely judge your voice-over-IP implementation based on current perceptions of their telephone service, which is generally high-quality and reliable. The figure 99.999%, or “five nines” of reliability, is an oft-quoted statistic that reflects how infrequently phone service is unavailable. Thus, the net architect must manage client expectations of service and reliability. To do this effectively, the various voice-over-IP network elements must be able to provide packet delay and packet loss information, signal-to-noise ratios and other statistics that affect voice and data transmission quality. Support for SNMP- and Remote Monitoring-compatible network management systems is another important factor. The ability to baseline the network and identify trends as they develop are also key ingredients for optimum performance tuning.

- **Examine existing carrier contracts.** Many net managers have carrier service contracts that should be reviewed prior to jumping into voice-over-IP service. You may need to divert a significant number of minutes from existing contracts to new IP services in order for the economics of the new hardware investments to be favorable. And when that diver-

sion occurs, you may end up paying more for your existing voice services.

For example, assume your existing service agreement specifies a rate of 5 cents per minute if you use one million minutes per month, and 3 cents per minute if you use two million minutes per month. You now use more than two million minutes per month (at 3 cents), but you estimate usage will be cut by more than half when you divert some voice traffic to the IP net. In this new scenario, the existing (non-

IP) voice traffic will cost you 5 cents per minute because you have dropped below the 3-cent price point. In other words, in order to reduce costs with new IP services, you increase costs for the remaining voice services. A word to the wise: Look at the interrelated economics before you commit.

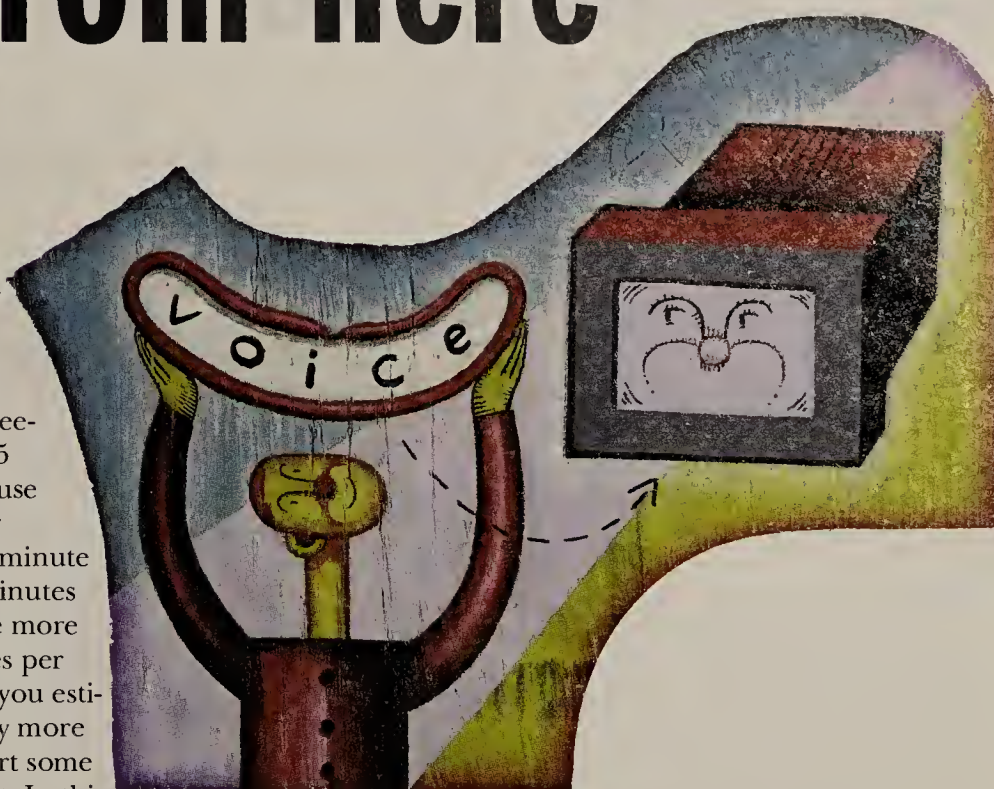
- **Weigh international vs. domestic.** One of the early driving factors in the voice-over-IP marketplace has been the promise of “free” or very low-cost long-distance service. But before you take this promise at face value, get a good handle on your calling patterns and determine what percentage of your traffic is international vs. domestic. With international rates in excess of \$1 per minute to some destinations, voice-over-IP rates that are only a few cents per minute look very favorable and may be worth some compromises in quality. The domestic story may prove to be completely different, as noted above.

- **Make sure it's compatible.**

Your voice-over-IP gateway may need to interoperate with a number of existing and future voice processing systems, such as your

PBX, automatic call distributor, interactive voice response system and others. Do the trunk circuit port types on your PBX match those available from your gateway vendors? Are you planning any future expansion or applications, such as a migration to ISDN or the installation of a Web-enabled call center? Make sure the new voice-over-IP hardware is compatible with all other voice systems.

- **Be careful about codecs.** Analog voice must be converted to a digital pulse stream before it can be placed in packets and sent over an IP net. A coder/decoder is the device that performs this voice processing function. A variety of standards are available, including the ITU-T G.711 (64K bit/sec voice), G.729 (8K bit/sec) and G.723 (5.2K to 6.3K bit/sec). In addition, a number of vendors



have developed proprietary schemes. Each alternative has unique characteristics, including the quality and delay associated with the coding algorithm, which vary with the amount of voice traffic being crammed into the packet. So it's important to understand the characteristics of the voice you're transmitting. Do the net requirements include the ability to pass fax traffic or music-on-hold over IP, or is voice traffic the sole need? Does the gateway product allow for multiple codec options, or is it locked in to one standard or algorithm? Ask some questions about the codecs to get the right match for your network requirements.

- **Manage your bandwidth.** Real-time traffic, such as voice and video, should be given priority over more routine transmissions such as file transfers and e-mail. Several methods are possible, including setting priority by IP address, setting priority by protocol or using a reservation mechanism such as the Resource Reservation Protocol. However, not all routers are configurable to support such schemes. Check your existing routing infrastructure to see if prioritization capabilities exist.

- **Keep ease of use in mind.** Remember the early days of alternative carriers, when an extra dozen access digits and account codes had to be dialed to complete a long-distance call? Users have higher expectations now. If voice gateways are to be accepted, they must be easy for end users to operate, and they must work within existing dialing plans. As you research various products, ask for a demonstration of the dialing sequence required to access the voice-over-IP network, and verify that it's compatible technically and procedurally with your existing methods of establishing, transferring and otherwise managing voice calls.

*Miller is president of DigiNet, a Denver-based data communications engineering firm. He has written 13 books on internetwork design and analysis, including Troubleshooting TCP/IP and Implementing IPv6. He can be reached at Mark@diginet.com.*

*If voice gateways are to be accepted, they must be easy for end users to operate and they must work within existing dialing plans.*



# Carriers take convergence plunge

*It's sink or swim for long-distance carriers, local providers and fiber-rich upstarts.*

By Susan Breidenbach

**T**he telecommunications industry is at what Intel co-founder Andy Grove calls a strategic inflection point. The data traffic explosion and technological changes are turning the carrier market on its head, changing strengths into vulnerabilities and enabling new players to challenge a previously immovable old order.

The distinction between local exchange carriers (LEC) and interexchange carriers (IXC) is disappearing as carriers use mergers and acquisitions to get end-to-end capabilities. Convergence is seen as a threat by some and an opportunity by others — start-ups with no circuit-switching revenue to protect embrace it wholeheartedly.

Transport convergence is already occurring on long-distance backbones as carriers move voice and data onto the same ATM network to achieve infrastructure efficiencies. It is a relatively simple process, but is confounded by the fact that some IXCs are starting out with more than two networks.

"Sprint has three separate ATM networks, and MCI has had a tradition of building a new network every time a new technology arrives on the scene," says John Johnson, director of global networking strategies at META Group in Stamford, Conn. "Convergence begins at home, folks."

## THE PLAYERS AND THEIR POSITIONS — INCUMBENT IXCs

### AT&T

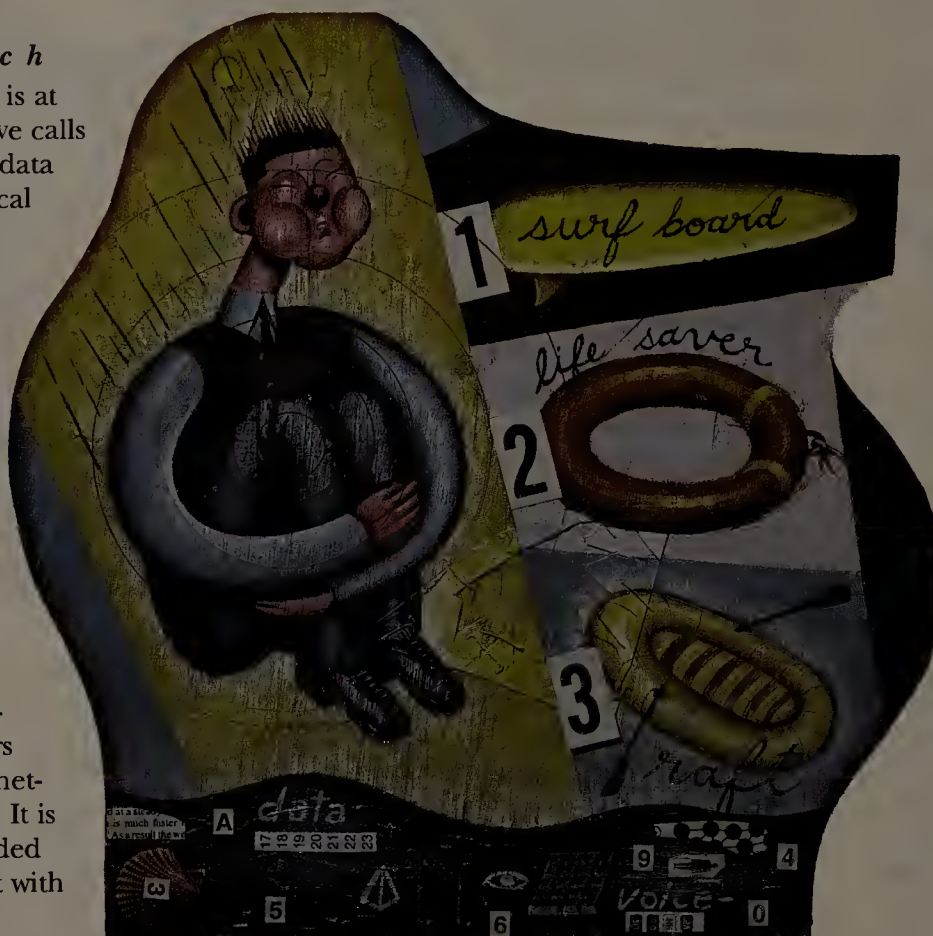
- Annual revenue: \$51 billion, divided fairly equally between business and consumer.
- Already engaged in IP telephony trials with select customers.
- Betting a lot — some say too much — on cable TV infrastructure for local access.

### WorldCom MCI (pending approval of merger)

- Annual revenue: \$32 billion (WorldCom \$10.4 billion, MCI \$21.6 billion).
- Combined entity will carry 40% to 50% of world's Internet traffic.
- Envious range of services — if it can come up with easy-to-buy bundles optimized for different customers.

### Sprint

- Annual revenue: \$16 billion.
- Relatively modern and homogeneous infrastructure with core based on ATM and 40-channel dense wave-division multiplexing technology.
- Experienced local phone company — operates as a LEC in 19 states.



## They used to be IXCs

Sprint in June rattled industry cages by announcing plans to build an Integrated On-Demand Network (ION). This network will use ATM equipment on customer premises to concentrate voice, data and Internet traffic, and ship it out over a broadband facility that would have to be leased from a local-access carrier.

The most remarkable part of the Sprint plan is a radical new pricing scheme that uses a virtual "bit meter" to keep track of bits rather than time.

"Sprint ION is one of the more responsible solutions — it has the germ of a good idea," says Thomas Nolle, president of CIMI, a technology assessment firm in Voorhees, N.J. "But it depends on the RBOCs selling fiber to Sprint on a wholesale basis, and there isn't that much dark fiber at the local level." Sprint also needs to come up with a more transparent ATM implementation so that the IP-to-ATM mapping doesn't have to be done by customers.

Sprint officials insist there are no local-access problems that can't be solved fairly readily.

"We can cover more than 50% of our target market through just 2,000 of the 26,000 central offices out there," a Sprint spokesman says. "So it's quite feasible for us to provision our own digital subscriber line service, or buy it from [competitive] LECs who resell it. We're already a LEC in 19 states, so we understand the local telephone business."

While Sprint's ION represents a precipitous plunge, AT&T is exploring the convergence

waters a bit more cautiously. The company last November decided to test-market IP telephony on an infrastructure over which it has end-to-end control: its own intranet. In May, the long-distance giant began delivering IP telephony services in Atlanta, Boston and San Francisco.

"The voice quality of our offering is really quite good," says Howard McNally, vice president of transaction services at AT&T. "We're testing price points and customer service and expect to expand our IP telephony business dramatically over the next 12 to 18 months."

To ensure local access facilities for converged services, AT&T is eschewing the asynchronous DSL (ADSL) approach embraced by Sprint and the incumbent LECs (ILEC) and gambling \$48 billion on the acquisition of cable TV giant Tele-Communications, Inc. (TCI). Billions more will have to be spent to upgrade TCI's infrastructure so it can support two-way traffic.

Unlike AT&T and Sprint, WorldCom already has a data-oriented infrastructure — at least until the \$32 billion merger with MCI is finalized. Then WorldCom's network will be the packet-switching python that swallowed the circuit-switching pig. About 75% of MCI's revenue — and a higher percentage of its profits — comes from traditional voice services.

Meanwhile, WorldCom just lit up a pan-European fiber-optic network that cost \$1.5 billion to build. Operating in conjunction with the company's Gemini transatlantic cable and U.S. infrastructure, the network connects 27,000 U.S. and 4,000 European office buildings over a seamless high-speed network that will support voice, data and video traffic.

The combined WorldCom/MCI entity will be a \$28 billion company handling 40% to 50% of the Internet backbone traffic, or more than three times as much as any of the other big backbone providers. Some say this will upset the balance among these companies, which currently interconnect each other's traffic for free and share equally in the cost of backbone upgrades.

Others scoff at the notion that WorldCom MCI would be able to start dictating terms.

"In the Internet market, barriers to entry are too low to let any one company completely dominate," says Benjamin Scott, chairman and CEO of IXC Communications, an Austin, Texas-based company that provides network-based information delivery systems. "Carriers like us are offering new choices all the time."

## New players with big bats

The start-ups believe they are positioned better



than WorldCom MCI because they have a clean sheet of paper to draw their networks on and a big bucket of capital to build them with. These "pure plays" are proceeding with a total lack of fear, buoyed by highly valued stocks and free of any installed-base dilemmas.

While traditional carriers are pinned down by the inertia of huge circuit-switching infrastructures, the new entrants "can step right up to the plate and swing," says Marion Boucher Soper, an analyst with investment banker Bear, Stearns in New York.

Instead of worrying about intricate bandwidth-management solutions and evolving quality-of-service (QoS) standards, the new players advocate a much simpler approach: over-provisioning. Fiber optics, after all, are on the same price/performance curve as electronics, so bandwidth is getting cheaper and cheaper. These companies tend to see ATM as a necessary evil under current circumstances and would rather put IP on Synchronous Optical Network (SONET), or even directly on the optics.

"ATM is an excellent technology for carriers that have to structure deployment strategies in an environment with constrained bandwidth," says Lew Wilks, president of Qwest Communications International's business markets unit in Denver. However, while Qwest's original intent was to build a "pure IP" network, market realities — ATM dominance on carrier backbones and the relative immaturity of IP switching technology — forced the carrier to implement ATM.

Qwest has spent \$2.6 billion building out a fiber infrastructure along highly protected railroad right-of-ways, where buried cable is least likely to get damaged by backhoes and tree roots. The company lays two side-by-side conduits — one with 96 fiber strands and one entirely empty, to accommodate future fiber technologies.

"Some of our competitors have only one fiber on some legs of their networks, while 24 is the least we have anywhere," Wilks says. "Rate arbitrage will

go away over time, so margins are what you need to survive, and we have a very low-cost infrastructure."

Founded by executives from competitive local access pioneer MFS, Omaha-based Level 3 Communications is approaching end-to-end services from the opposite direction. The company has installed local fiber loops in 50 U.S. cities and another 20 or so abroad, and is connecting the dots with a long-distance fiber network.

"Voice will eventually be just another application on an IP network, and ours is the first network totally optimized around IP traffic," says Ron Vidal,

senior vice president in charge of new ventures for Level 3. "We have no circuit switches at all."

Level 3 acquired Xcom Technologies earlier this year and consequently now owns technology for connecting IP networks to the Signaling System 7 call signaling infrastructure. That will help Level 3 deliver call control, which has been one of the missing pieces in IP telephony.

Williams Communications in Tulsa, Okla., is another one of the young turks starting with a clean slate and deploying huge amounts of fiber around the country. The company is building out its network with 144-fiber cable and deploying OC192 with dense wave-division multiplexing on each fiber. The lack of QoS for IP convinced the carrier ATM was the only way to go.

Williams eliminated cross-connect equipment by migrating to GX 550 ATM switches from Ascend Communications. The company is also migrating SONET into the ATM switches and thus avoiding SONET terminal equipment.

"So we're saving 50% to 80% on hardware costs," says Wayne Price, manager of technology development for Williams' network division.

Some experts doubt that over-provisioning alone can guarantee business-quality voice in the long run. The demonstrations sound great now, but the networks don't yet have any traffic to speak of.

Nevertheless, all that buried fiber is clearly a precious resource.

"The cost of switching has gone down by orders of magnitude, while the cost of right-of-ways has not changed that much," says Hal Varian, dean of the School of Information Management and Systems at the University of California, Berkeley. "Fiber in the ground is like money in the bank."

And the bandwidth bandits are using it to buy market share. While this is just a short-term strategy, large corporate customers can take full advantage of it. "There's only an upside for enterprises," Soper says. "They are getting accelerated services at great rates."

### ILECS: Eating their young

Clean slates are an advantage in a lot of ways, but they can also imply lack of experience. Here the scales are weighted heavily in favor of the incumbents that have been deploying and supporting huge networks for a long time.

"The traditional carriers haven't been the movers, but they can certainly be very effective followers," says Neville O'Reilly, director of enterprise consulting for TeleChoice in North Brunswick, N.J.

The biggest convergence challenges are at the edge of the public network, in traditional ILEC

*"Margins are what you need to survive, and we have a very low-cost infrastructure."*

Lew Wilks, Qwest

### THE PLAYERS AND THEIR POSITIONS — THE 'PURE PLAYS'

#### Qwest

- Annual revenue: \$1.6 billion.
- Huge market cap and venture backing for network buildout, plus good jump-start with strong carrier's carrier business.
- Has empty conduits to accommodate future fiber-optic technologies.

#### Level 3 Communications

- Annual revenue: \$348 million.
- High-speed local-access infrastructure.
- Xcom acquisition provides SS7 integration technology to enable call control on IP networks.

#### Williams Communications

- Annual revenue: \$1.7 billion.
- Subsidiary of Williams Co., an energy company with huge pipeline infrastructure and rights of way that Williams Communications can leverage.
- Extensive experience delivering traditional and interactive video services.

### THE PLAYERS AND THEIR POSITIONS — INCUMBENT LECs

#### Bell Atlantic/GTE (pending approval of merger)

- Annual revenue: \$53 billion (Bell Atlantic: \$28 billion, GTE: \$25 billion).
- Merger would combine the ILEC whose region includes the heaviest concentration of commercial and financial activity, as well as population, with the ILEC that has the broadest geographic coverage. (GTE operates in 28 states from Hawaii to Florida.)
- Unless the combined entity is forced by regulators to divest one or more businesses, the deal will also give Bell Atlantic access to GTE's 17-state long-distance operation and its Internet backbone division, the former BBN Planet. Bell Atlantic will thus be well-positioned to offer end-to-end services to big customers.

#### SBC Communications/Ameritech (pending approval of merger)

- Annual revenue: \$43 billion (SBC: \$26 billion, Ameritech: \$17 billion).
- SBC has been focusing on consumer market and last mile solutions, including aggressive ADSL rollouts.
- Ameritech is spending \$2 billion a year on its data network buildout, and has extensive extranet offerings for automotive industry.
- Ameritech has the largest ATM-based network access point in the nation, handling about 20% of the world's Internet traffic.

#### BellSouth

- Annual revenue: \$22.8 billion.
- Huge deployment of ATM switches makes its infrastructure convergence-ready.
- Partnering with EDS to provide outsourcing of voice/data network services to small and mid-sized companies.

#### US WEST

- Annual revenue: \$11 billion.
- Serves the most sparsely populated region and faces big threat from cable TV providers; proceeding with extensive ADSL deployment.
- Leveraging its experienced Interprise data networking unit to provide converged services and outsourcing.

territory. The ILECs are in a difficult situation, with \$20 billion to \$30 billion sunk in circuit-switching equipment on depreciation schedules of up to 20 years. They want to protect these investments and avoid cannibalizing their traditional voice business.

"If their inaction creates a vacuum, alternatives will come into play," says Joe Firmage, chairman and CEO of USWeb, a Santa Clara, Calif., company that offers various Web services through a network of affiliates. "They can either eat their own young or watch competitors eat them."

Now ILECs seem intent on swallowing up each other. Bell Atlantic just one-upped SBC Communications' Humpty Dumpty act of gluing the RBOCs back together again by announcing plans to merge with GTE. The combined \$53 billion entity would surpass AT&T as the largest U.S. carrier.

Many regard the proposed merger with dismay. GTE has been the wild card in the traditional ILEC camp. While the RBOCs are awaiting the regulatory go-ahead before they can get into the long-distance market, GTE has been under no restraints.

The company is an ILEC in 28 states from Hawaii to Florida — albeit largely in secondary and



tertiary markets. Additionally, it bought 24 strands of fiber from Qwest to start deploying a long-distance network.

GTE expects to be the biggest provider of ADSL services by year-end. IP telephony trials have all been internal so far, but the company plans to roll out commer-

cial IP fax services in the fourth quarter.

The Bell Atlantic/GTE merger will take at least 12 to 18 months to complete and may never go through. Besides significant regulatory hurdles, the two companies have divergent management perspectives, and GTE's shareholders will have to

approve a deal that has the market pricing their stock at less than it was before the merger was announced.

Meanwhile, Bell Atlantic is venturing into convergence waters with a recently formed subsidiary called Bell Atlantic Data Solutions Group (BADSG). The idea

is to have a separate, unregulated entity that is a lot more nimble than the huge parent RBOC and that can compete on more of a level playing field with companies such as Qwest, Level 3, and Williams.

BADSG is in charge of building the new packet-switched long-distance network Bell Atlantic announced in June. First-stage deployment will connect hubs in Boston, New York, Philadelphia and Washington, with plans to extend the network throughout Bell Atlantic's 13-state region, across the country and around the world. Commercial service delivery could begin as early as January 1999.

"We will be spending \$400 million over the next three or four years just in the Bell Atlantic footprint," says Herb Osher, vice president of marketing for Bell Atlantic Network Integration, now a part of BADSG. The ATM-based network will initially be used mainly for business data services, including managed IP networks. Because parent company Bell Atlantic is still prohibited from offering long-distance voice in its own region, deployment of converged voice services on the new network is "contingent on regulatory relief," Osher says.

US WEST is approaching convergence from the opposite end. Threatened on the local-access front by cable-TV companies, the Denver-based RBOC is deploying integrated dial tone and "Web tone" services for enhanced local access. The company has launched ADSL services in 40 markets across Arizona, Colorado, Idaho, Iowa, Minnesota, Montana, Nebraska, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming.

"Using second-generation DSL technology, we may be able to deliver DSL services over 60% to 70% of our loops," says John Charters, vice president of Internet services and application development at US WEST in Denver.

Indeed, while other telcos focus on laying fiber, the RBOCs and GTE are effecting a copper renaissance. SBC is focusing on the residential market as it successively glues Baby Bells back together. SBC's Pacific Bell subsidiary has been particularly aggressive about rolling out DSL services.

According to Charters, these developments disprove claims that the ILECs don't get it when it comes to convergence. "We do get it; we're just more pragmatic in our approach," Charter insists.

The question is whether the market will wait for them.

"I want to see one of the ILECs step up to the plate and tell Wall Street, 'We're going to take some losses while we make major investments in a converged network,'" Firmage says. "It would be enormously painful, but they have the cash to do it with and the runway to take off from — if only they have the vision and the courage to proceed."

Breidenbach is a consultant and freelance writer in San Mateo, Calif. She can be reached at sbreidenbach@usa.net.



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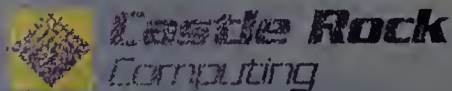
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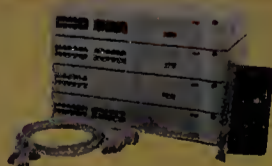
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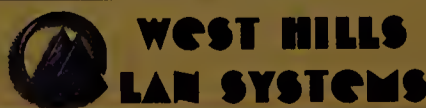
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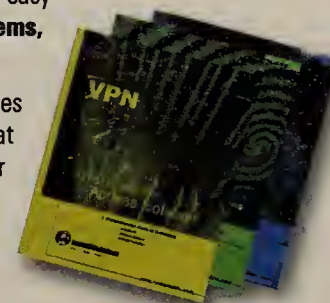
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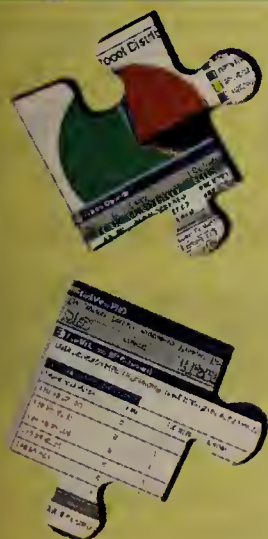
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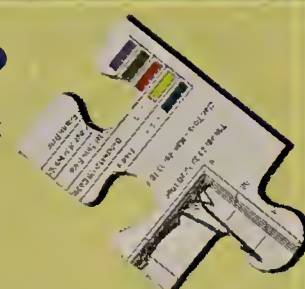
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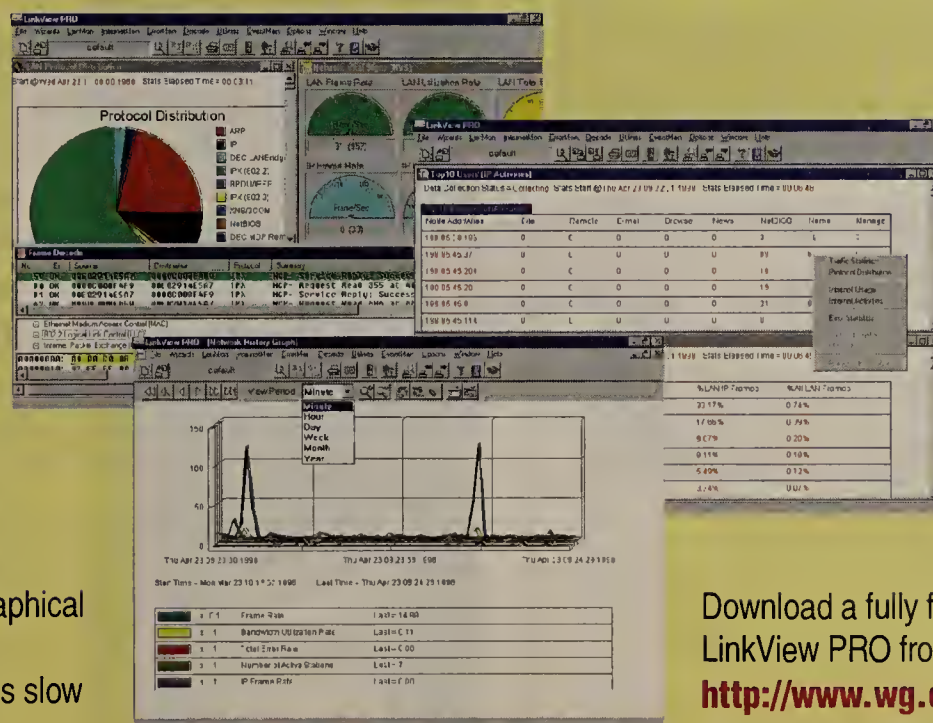
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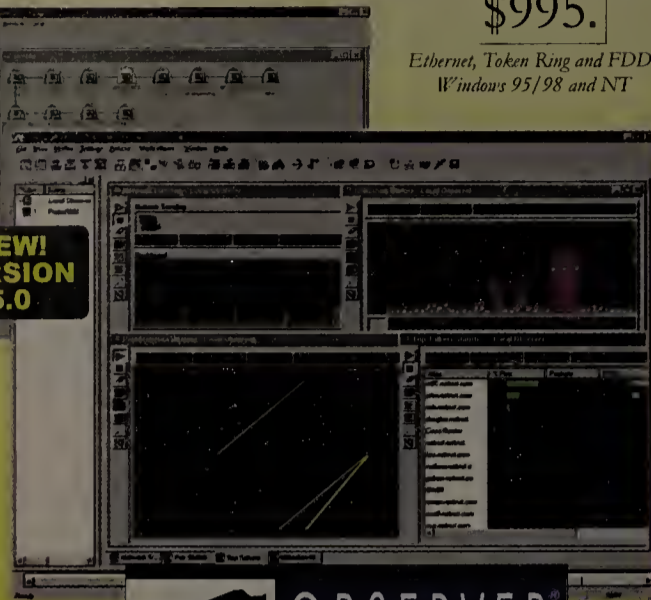
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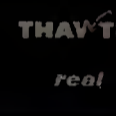
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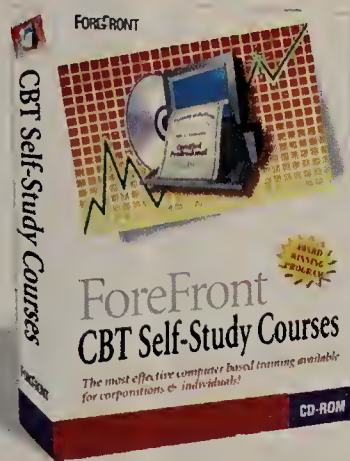
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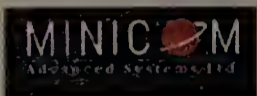
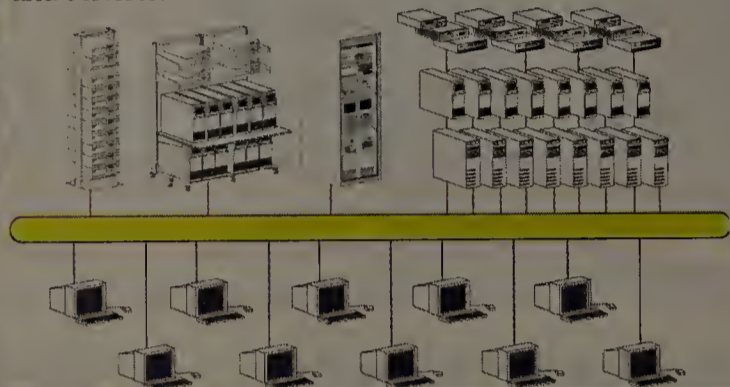
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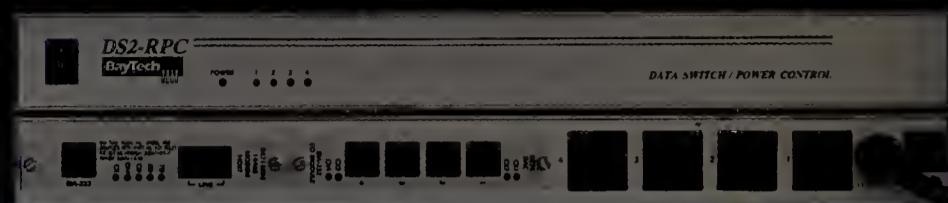
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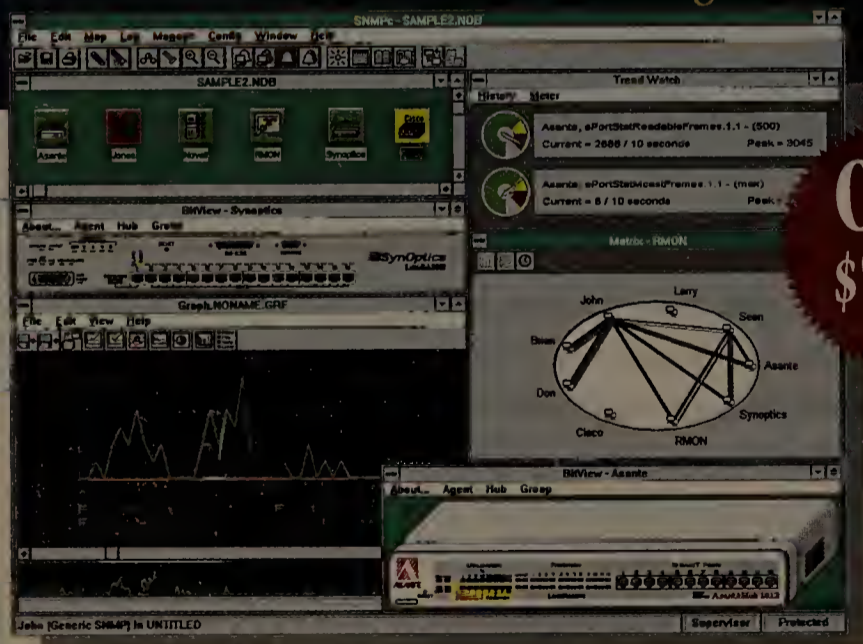
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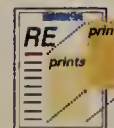
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## Def Con

Continued from page 1



The 120K-byte BackOrifice Trojan horse program "will make it easy for a 5-year-old" to screw things up, shouted The Cult of the Dead Cow product presenter, hidden behind a mask. BackOrifice can be uploaded to someone else's Windows 95 or NT machine through e-mail or buffer overloads. Once there, it can be used by a hacker to create directories and copy files on the remote machine, and to gain access to the network.

A version of BackOrifice for Unix and a Java client are on the way, the masked man claimed.

For its part, Microsoft issued a kind of "what, me worry?" statement that said, "Windows 95 and Windows 98 users following safe computing practices are

not at risk, and Windows NT users are not threatened in any way by this tool."

Just to show how rotten they are, after the demo members of The Cult of the Dead Cow tossed CDs said to contain pornography to the audience, setting off a scramble among the thousand or so (mostly young guys) in the crowd.

In the midst of this hacker hell, federal agents trying to blend in seemed at a distinct disadvantage. With remarkable precision, the hackers, wannabes and cyberpunks picked out several agents from the National Security Agency (NSA), Army intelligence units and the Department of Defense's office of criminal investigations.

Compelled to admit their affiliation, each agent was offered an "I am the Fed" T-shirt.

Amid the slot machines' mechanical chiming, it was a

weekend of late-night partying for the attendees, while the daylight hours were filled with advice on how to clone GSM cell phones, eavesdrop on satellite-based traffic and attack casino systems (the casino's customer-service LANs and electronic signs are hard but doable; the slot machines, forget it; and tiny cameras are everywhere).

One Def Con attendee — no names, please — who came all the way from Amsterdam for the event, said GSM phones are prevalent in Europe and it would be hard to resist using the information he had picked up at Def Con.

San Francisco-based criminal defense attorney Jennifer Grannick showed up to remind the serious hackers and the merely curious that breaking into networks is illegal whether damage is done or not.

Grannick said the FBI called

her before she came, urging her to advise Def Con attendees to cooperate by talking when caught. "That's B.S.," she said. "Don't talk to cops." She also reminded hackers not to throw evidence in the bushes when they see the feds at their doors, and to get a lawyer, presumably one like herself.

Though it's impossible to know what lies in the heart, many attendees seemed to be computer-savvy college kids enjoying a weekend walk on the wild side. Breaking into computer networks may be a rite of passage into manhood these days, getting the power rush, showing off the skills.

One Def Con attendee said he was drawn to this counter-culture because his weight problem made him feel something of an outcast in the "real" social world, while his online friends were impressed with his coding skills.

And there's apparently a thin line between the hacker and the security professional: Companies such as Secure Computing, which helped organize the event, were known to have their eyes out for talent that can be squeezed into a corporate suit rather than a jail cell.

In addition, intelligence agencies around the world are said to be trying to recruit young hackers into the spy game.

Richard Thieme, who gave the Def Con keynote, is a former Episcopal priest who dropped out to join the cyber avant-garde to lecture on the "digital construction of reality." Thieme said young hackers have told him stories of being offered full-time jobs as high-tech spies for foreign governments and the NSA. ■

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## ZKS

Continued from page 1

enable Internet users to keep their identities secret while Web browsing, sending e-mail and participating in chat sessions.

While the Windows software could be put to criminal use, it might also attract companies that want to discretely conduct legitimate market research and competitive analysis over the 'Net, among other things.

The company previewed the software at the recent Def Con hacker convention and plans to formally introduce it in a few weeks.

ZKS also intends to announce that Canadian ISP TotalNet, as well as about a dozen other ISPs, will support the ZKS "Anonymous IP Protocol" on their servers.

ZKS, which has about 20 employees, expects to offer its software free to ISPs and for as little as \$5 per month to customers to get things rolling. While an enterprise could also host ZKS software on its servers, the start-up is counting on ISP support to create "an anonymity cloud" through which users can cruise the Internet without a trace, said Austin Hill, founder and president of ZKS and former chief technology officer of TotalNet.

"If you're a Chinese dissident posting messages for freedom, for instance, nobody is going to be able to go to an ISP and say

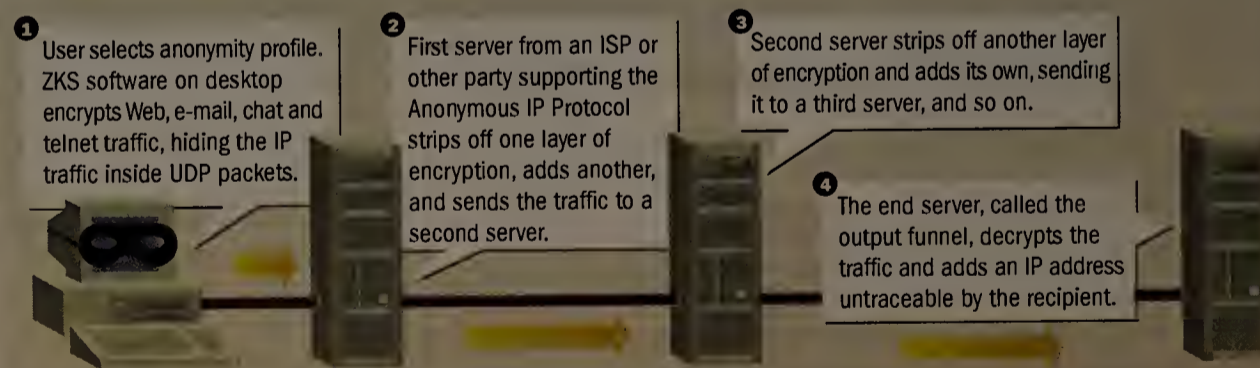
we need your help tracking him down," Hill said. "The ISPs can't be held responsible anymore for the actions of their users."

## ZKS software in action

The Anonymous IP Protocol enables users to select up to any of five different pseudonyms, while ZKS desktop software encrypts outgoing traffic and wraps it in User Datagram Protocol (UDP) packets.

## LIKE AN UNLISTED PHONE NUMBER FOR THE 'NET

ZKS offers anonymity over the 'Net through a process called onion routing.



The first server in what has to be at least a two-hop system gets the UDP packets, strips off one layer of encryption to add another, then sends the traffic on to the next server, which strips off yet another layer of encryption and adds a new one.

"The user can control how many hops he wants to make," Hill said. "The more hops, the more security." He acknowledged that all the encryption

and decryption may degrade performance.

At the final server, the output funnel in ZKS' parlance, traffic is spit out unencrypted with an IP address untraceable by the recipient.

The process is known as onion routing, a technology that Hill said could end up as a request for comment at the Internet Engineering Task Force.

While Chinese dissidents

stand to benefit from the ZKS technology, so do others, including garden-variety criminals. Some ISPs are interested in offering anonymity services but aren't entirely comfortable with complete, untraceable anonymity.

ZKS' technology appears as though it would make it next to impossible to track down senders of death threats, hate mail and other such traffic, said Michael O'Dell, vice president and chief

scientist at UUNET Technologies, a WorldCom subsidiary. O'Dell said when federal marshals come looking for help in criminal cases, UUNET wants to be able to assist them.

AT&T's WorldNet division and America Online said they are looking to organizations such as the Online Privacy Alliance for guidance in developing Internet privacy policies. Existing policies basically say the

a two-edged sword. On one hand, ZKS software may offer consumers privacy on the Internet — something the FTC has long said it wants to see. On the other hand, the software could hinder catching the bad guys.

"It could make our job harder," said David Medine, associate director for credit practices at the FTC. "But consumers should be able to choose an anonymity control."

Walter Effross, an associate law professor at the Washington College of Law at American University, said he has advised his students to use anonymity services such as those from [www.anonymizer.com](http://www.anonymizer.com) to do research on the World Wide Web for sensitive projects.

If large numbers of Internet users end up adopting the ZKS anonymity method, business on the Internet is certain to change dramatically, Effross said. That's because Web sites often collect as much data as they can about visitors based on their IP addresses.

Lawyers no doubt would wind up raising legal objections with ISPs or others operating Internet anonymity servers. "If these service providers decide to embrace anonymity like this, there's the question of whether they have contributed to criminal activity through negligence by participating," Effross said.

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## Y2K

Continued from page 1

accused PC makers of trying to whitewash problems in their products and accused the NSTL of providing the paint.

"We can prove that we're right, and we can prove that our products work," said Coppel, who counts the British Defense Ministry and Philips among his company's customers. "All Dell can do is come back and say that they have a fix that you can download that still leaves a [Real Time Clock] component in their machine returning a date of 1900" on Jan. 1, 2000.

IT managers grappling with Year 2000 problems appear to be divided on the matter, at least according to interviews and newsgroup chatter.

While there are multiple layers to the dispute, here is the crux:

Every server and PC that Dell has shipped since Jan. 1, 1997, is Year 2000 compliant in accordance with the widely used YMARK2000 test from the NSTL, the company said. (Compaq relies on the same test.) As for older machines,

BIOS upgrades and patches needed to achieve compliance are available for free on the Dell Web site.

What is not Year 2000 compliant in Dell machines or in the vast majority of those from other vendors is the Real Time Clock (RTC), a chip that the BIOS accesses to get its time

such as those found in manufacturing plants, would be most susceptible to these problems, Coppel said. All parties agree that trouble will arise primarily in instances in which an application bypasses the BIOS to access the RTC directly.

Where they part company is over the likelihood and the consequences of this occurring.

The vendors said tests on more than 1,000 off-the-shelf software programs have failed to turn up even one application that bypasses the BIOS. However, Prove It 2000 argued that others undoubtedly do bypass the BIOS and that

such tests are meaningless when applied to custom-built applications.

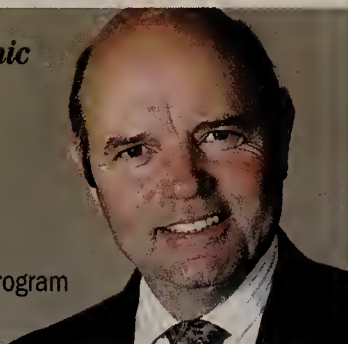
Customers such as Stuart Greenfield, an analyst in the Comptroller of Public Accounts department for the state of Texas, clearly prefer to err on the side of caution.

"To me, Year 2000 compliant is a binary decision: It is or it isn't," he said. "And if the RTC is not Year 2000 compliant then it isn't, even though the manufacturers say no applications should write to the RTC."

The real issue is money, not technology, Greenfield added.

*"When you're in a panic mode you have a tendency to grab at anything. We'll be seeing a lot of that."*

David Cunningham, Dell program manager for Year 2000



and date information. However, a Year 2000-compliant BIOS is all that's necessary, Dell insisted, because the BIOS will correct any noncompliant data provided by the clock. The NSTL concurred with this judgment.

Prove It 2000 and some customers disagreed.

Having a component that returns a date of 1900 in the year 2000 is not irrelevant, Coppel said. "For probably 85% to 90% of computer users it won't make a difference. But for 10% to 15% it will make a very significant difference," he said.

Time-sensitive applications,

synchronized with the information that's part of the corporate infrastructure. If the schedule of our weekly project meetings changes, I want to know right away."

MIS groups may see an expanded Java presence in the coming months.

Sun last month began shipping the latest version of its PersonalJava platform with new features including support for the Java Database Connectivity interface and Remote Method Invocation, and lower memory requirements.

No one expects the next generation of appliances to replace laptop or desktop PCs wholesale.

But the devices are increasingly able to take over some of the functions that now have to be done on PCs for lack of a viable alternative.

"If you're a Windows user and you need to have full Windows application access and use, then you'll still need a laptop," said Diana Hwang, research manager for hand-

held companion devices at International Data Corp., a Framingham, Mass., market research company.

"But if you use only a subset of these, such as only viewing PowerPoint slides, or basic spreadsheet functions, then you'll look at these devices," she said.

Some are not content to wait for the new technology. Jon Rosenson, technical support manager for Stargate Industries, a Pittsburgh ISP, has been using the Nokia 9000 Communicator to manage his company's Unix servers while away from his desk.

"I was on the road in Washington, D.C.," he said. "I got a voice call [via the 9000] that our users couldn't log in for some reason. I dialed a local access number in D.C., then used telnet to our TCP/IP net and was authenticated. Then I found a server that was running out of swap space and rebooted it. Our users were able to log back in." ■

Vendors don't want to shell out the money to address RTC problems, given the competitive nature of the market, he said.

David Cunningham, Dell's program manager for Year 2000, insisted that saving money for Dell customers is the company's prime concern.

"I probably get four or five calls a week from major corporations or large organizations that are getting these tests that show that their systems fail," Cunningham said. "Of course, the people who provide those tests always have a fix that they offer to sell."

Dell believes these third-party fixes to be "absolutely unnecessary," he added.

According to a recent Gartner Group study, companies are devoting 7% of their Year 2000 budgets to paying consultants.

Cunningham recounted a case in which a company paid \$15,000 up front, plus \$100 per machine, to have 150 computers tested and fixed. The "fix" did nothing more than produce an acceptable test result, he claimed.

"None of that had to be spent," he said. The customer, as one might expect, declined an offer to speak publicly about the matter.

Dell expects the issue of questionable fixes to grow as time for addressing Year 2000 problems ticks away.

"If organizations haven't done their due diligence to this point, you're going to see the red button hit, and when you're in a panic mode you have a tendency to grab at anything," Cunningham said. "We'll be seeing a lot of that." ■

## Getting vocal about Y2K

Just when you were beginning to fear that Year 2000 alarmists might spook every man, woman and child in America, riding tall to the rescue comes a most unlikely white knight.

More specifically, he's a white knight wearing trademark white bucks: singer Pat Boone.

The Year 2000 National Educational Task Force last week announced that Boone will record a number of public service announcements aimed at raising Year 2000 awareness among the masses.

"I want to help bring Y2K to the family dinner table for dialogue," Boone crooned in a press release.

Chewing over BIOS idiosyncrasies between bites doesn't seem likely at any household we know of. But, hey, go get 'em, Pat.

— Paul McNamara



Singer Pat Boone will sound off on Y2K problems.

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## Politicians don't get the 'Net

**I** was extremely irritated by a comment from Commerce Secretary William Daley. He was quoted by *The Miami Herald* (July 31) as saying, "Too many Americans are not able to take part in the growing digital economy. . . . The growing trend of information 'haves' and 'have-nots' is alarming."

The concept being bandied around is that we're in danger of splitting into two societies: those with access to the Internet and online services, and those without. The assumption is that those

without access will be disadvantaged, and cut off from opportunity, resources and the mainstream of culture.

I contend that this idea is a crock. By way of a parallel, not having a car is a definite disadvantage in society.

Sure you can take a bus or train, but in many places these are not exactly the most efficient ways of getting from A to B (unless, of course, you happen to want to go by way P, Q and R, don't mind walking the last three miles to B, and if getting there days after you left doesn't matter).

So is Congress rushing through legislation to ensure that everyone can afford a car? Is it trying to improve public transportation? Is it even trying to make existing public transportation more effective? (No, no and no.)

So why are politicians flocking to the online haves and have-nots as a cause célèbre? Simple: politicians are attracted because online issues such as copyrights, pornography, filtering, commerce and so on are hot.

This isn't about public policy folks, this is about pop politics — delivering the sound bite, grabbing attention, being seen doing "something," being proactive . . . being a politician.

I could rail about the motivations of the political world at length, but I will forego the pleasure. Instead, let us consider what universal access to the online world means to Joe Average.

Mr. J. Average (married, two point something kids, a 2-year-old mid-

range car, yadda, yadda, yadda) needs Internet access like he needs a second head. Actually, if the choice existed, he'd probably plump for the second head — I bet it would have more immediate value to him.

But let's say we march into his life and somehow give or enable his 'Net access. What does he do with it?

He'll get sports scores, check the weather and see how his shares are doing.

He'll buy some books and check out the specs on a new Chevy he plans to buy (after he's checked out the specs on the Corvette he can't afford).

This list is endless, but it is all about consumerism. As if being a consumer in the real world isn't enough, we have to propel him into another, more efficient way of parting him from his money. Worse than that, he's got to buy a computer, learn to use it, buy access and learn how to use that. Gee, not asking much are we?

You might argue that J. Average also gets access to entertainment and a vast virtual library. But we expect him to pay for entertainment, and we're putting little effort and finance into our real world library system. Perhaps if enough of the American population is online in the next few years it will be argued that there's no need to finance public libraries at all.

What we need is for the politicians to get off this ridiculous bandwagon and stop pretending that the haves and have-nots are defined by Internet access. They're defined by educational and employment opportunities, tax burden, social fabric and scores of other factors that are infinitely more important and relevant to a happy, successful life than Internet access.

Consumers should get access to the Internet because they want to and can afford the time and costs involved, not because politicians happen to create better consumers in the name of creating a better society.

Your rant to [nwcolumn@gibbs.com](mailto:nwcolumn@gibbs.com) or (800) 622-1108, Ext. 7504.



Mark Gibbs



## 'NET BUZZ

The latest on the Internet/Intranet Industry

**THERE'S \$40 MILLION DOWN THE DRAIN** Well, the federal government can now abolish the special prosecutor law.

Thanks to a start-up based in the New York City borough that brought us **Tony Danza** and **Larry King**, any search for the truth can begin and end at your desktop computer.

At least that's what **Seem Software** claims can be accomplished with the ironically named **Truster** software, which officials of the Brooklyn company call a "PC-based lie detector."

Developed for the Israeli military for border checkpoints, **Truster** allegedly measures "microtremors" in the human voice to determine if someone is being honest or working on commission. So phenomenal is this software, **Seem** officials say, it can "pinpoint the cause of stress and know whether it is caused by a lie, excitement, an exaggeration or apprehension." (What, no room for "inner demons"?)

"The technology allows us to analyze the human voice through a telephone, television, audio tape or microphone," **Seem** brags on its Web site. "We can do all this in real time and without the other person being aware of the test."

Sounds like a swell endorsement opportunity for **Linda Tripp**.

**Truster** users plug their phone, tape player or a microphone into their computer to determine if the person in question is on the level. Each vocal utterance elicits a judgment that flashes on your PC monitor. Instant verdicts range from "Telling the Truth" and "High Level of Excitement" to "False Statement" and "You Have a Bright Future in Politics."

Hint: Avoid phrases such as "These aren't my pants, officer" and "I have no idea how these pictures got on my hard drive."

I haven't tried **Truster**, primarily on the advice of my attorney, but **Makh-Shevet**, the Israeli firm that developed the CD-ROM-based product, claims an 85% accuracy rate.

However, a *Newsweek* reporter who tested the software on colleagues and friends indicates that **Truster** is about as reliable as flipping a coin.

**Truster** sells for \$150 and can be ordered at [www.seemsoftware.com](http://www.seemsoftware.com). Future versions reportedly will be able to charge you with perjury.

**A DIRE WARNING** The government wants to control the Internet.

It's a sentiment voiced often by cyberspace libertarians and conspiracy theorists.

Now you can add a former member of the **Federal Communications Commission** to the list of people speaking out about Washington's increasing involvement in the Internet.

**Rachelle Chong**, who served on the FCC from 1994 to 1997, says politicians in our nation's capital are beginning to lean on technology companies for a number of reasons, the primary one being preceded by dollar signs.

"Sales on the 'Net are expected to surpass \$300 billion by the year 2002," she said in a recent speech. "Once politicians noticed that, more and more of them have taken to coming around Silicon Valley asking for campaign donations."

**Chong**, who left her federal gig last November to become a partner at **Coudert Brothers**, an international law firm based in Palo Alto, Calif., says the industry better wise up before it's too late.

"Washington can make your life quite miserable if you refuse to play the political game," she says. "They can impose regulations on your industry, restrict the export of your product, investigate you, block your merger or require you to restrict access to cybersmut."

Not to mention forcing you to watch **C-Span**.

**Chong** recommends some time-honored strategies for dealing with politicians: Suck up to them, give them money and show your face in Washington.

*'Net Buzz* doesn't need **Truster** to know when readers aren't being honest about having some good Internet- and intranet-related news tips. So end this pathetic charade and send your best stuff to **Chris Nerney** at (508) 820-7451 or [cnorney@nw.com](mailto:cnorney@nw.com).

Chris Nerney

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high-speed  
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**Xylan.**

Covering 110 acres, the Getty Center was conceived and built by the J. Paul Getty Trust to unite its museum, institutes, and grant program on one site. "We were given the opportunity to do it right when it came to building our network from the ground up," says Bryan Moye, network analyst for Getty Information Technology Services. "We went to Xylan as our partner in this endeavor when we found that all of our network requirements could be met with the OmniSwitch. Every other vendor's solution required multiple boxes, which when taken together still couldn't do all the things that the OmniSwitch can do."

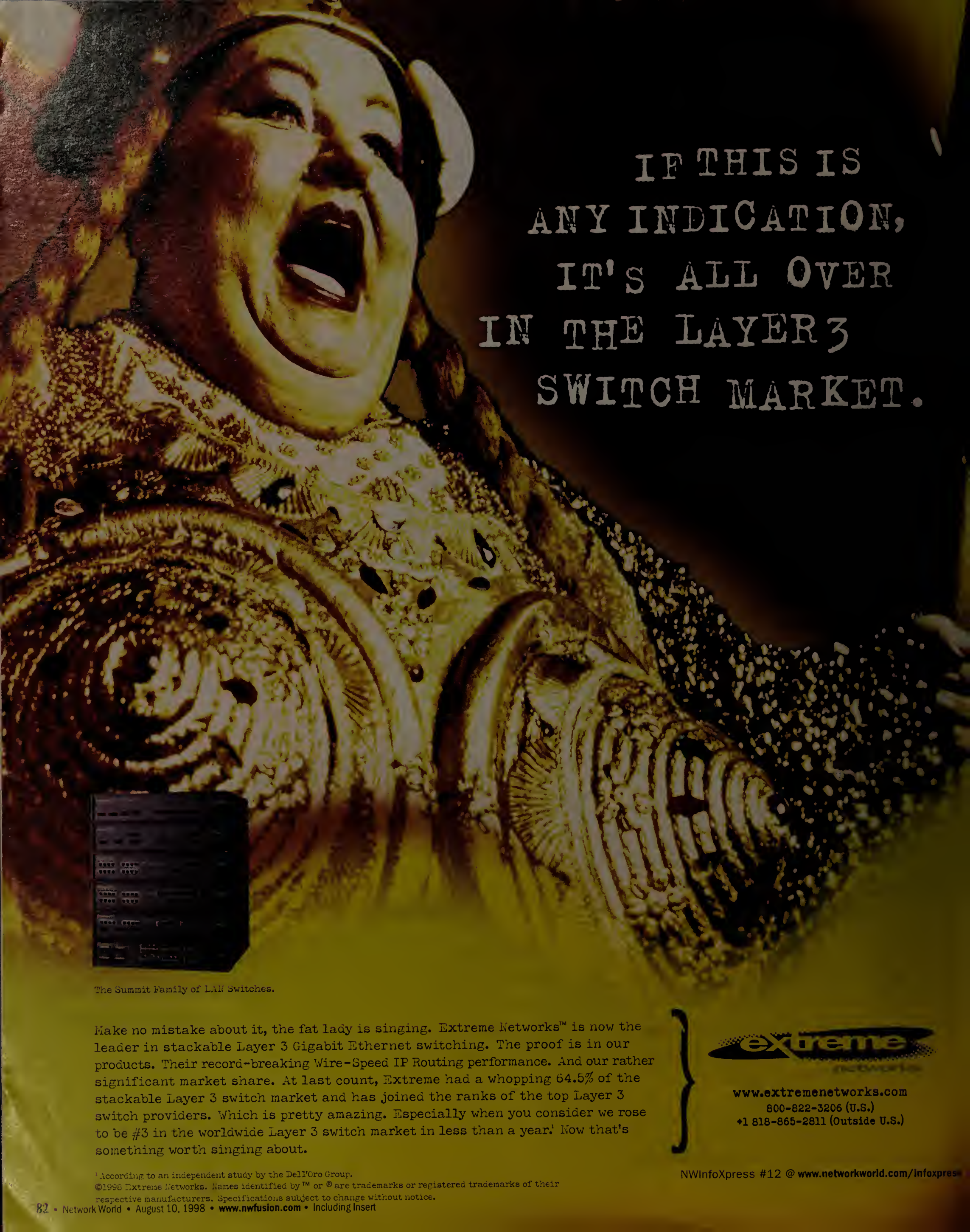
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**Services:** Firewalls, Authentication, Multicast, Broadcast Management, Protocol Translation, Mobility, QoS, Prioritization, Compression, Policy-Based Management.

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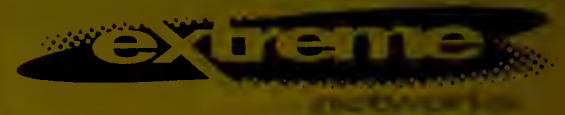
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IT'S ALL OVER  
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<sup>1</sup>According to an independent study by the Dell'Oro Group.  
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